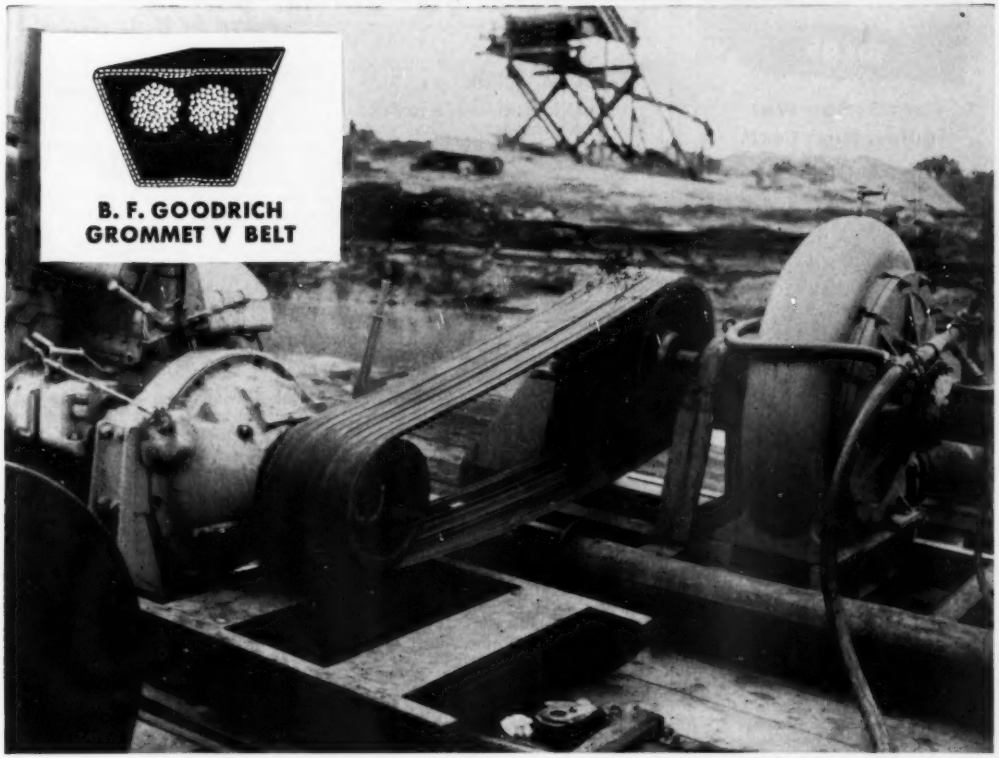
RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Where B. F. Goodrich grommet belts are outlasting others 2 to 1

B. F. Goodrich grommet V belts cut costs 20 to 50%

THOSE nine belts run a sand pump 10 hours a day, 6 days a week. Ordinary V belts had to be stretched extra tight in order to run the heavy pump. In addition to causing bearing wear, the tight fit pressed sand into belts and pulley, resulting in serious wear on both. When B. F. Goodrich grommet V belts were installed, it was found they gave good gripping action, even though not tightened. With belts running at less tension, abrasive wear was cut way down, belt and pulley life doubled, and heavy bearing wear in the motor eliminated. Here's the reason B. F. Goodrich grommet V belts outperform ordinary belts:

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

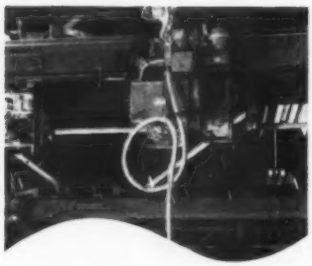
Better grip, less slip — Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet!—No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. See your local B. F. Goodrich distributor. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio* (available in Canada).

Grommet V Belts BY
B.F.Goodrich
RUBBER FOR INDUSTRY

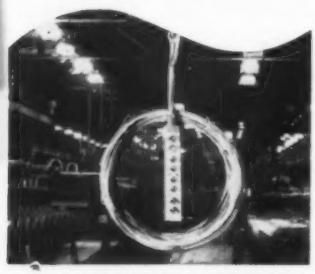
MATERIALS Handling IDEAS

Push-Button War Against High Costs



● This plant transformed a slow, costly handling job into a simple, push-button operation. The job was to remove wire from winding drums and convey it to the next operation. To reduce handling costs, a new idea was tried: a ½-ton, single I-Beam *Reading* Electric Crane was custom-built for the job. *All* motions were motorized. Now one man controls the entire operation faster and more economically—by simply pushing the right button.

If you believe that *modern* materials handling can reduce costs in your plant, get in touch with *Reading*. At no obligation, a *Reading* Engineer will personally analyze your handling operations. A note on your letterhead will put him to work.



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CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING CRANES

'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Frederick M. Gibson

Frederick M. Gibson, a pioneer in the Plant Engineers Clubs and a veteran of the sugar industry, died at Jamaica, N. Y., May 14.

Formerly with the American Sugar Refining Co., he was one of the founders of the Boston Plant Engineers Club formed in 1915 and, in 1922, was active in the formation of the Engineering Societies of New England of which the Club was a Charter member. During this period he was also active in the ASME and as a member of the Boiler Code Subcommittee on the care and use of power boilers. He also participated in the preparation of the code which has been in use 25 years with only minor changes.

After transfer to the Brooklyn plant, he started the Plant Engineers Association of New York and was the first president. Although he retired some years ago, he was active in club affairs to the very last.

For many years he was also executive secretary of the Sugar Industry Technicians and was a specialist on bone char and kilns. In 1950 he received the Stevens Metropolitan Club award and last year the Stevens Alumni Association Award for loyalty and devotion to Stevens Institute of Technology.

Gorton-Pew Investigates Further

AFTER FURTHER work by Gorton-Pew Fisheries Co., Ltd., along the lines of deodorization of their fish meal process, they find that a temperature of 1250 F should be considered a minimum for incineration rather than 1400 F.

The article covering their process "Industrial Odors Take the Heat Cure," appears in the July 1952 issue. Reference is made to the continuation of the article on page 138, the first sentence which reads: "To accomplish this, all of the exhausted gases must be heated to a temperature of at least 1400 F before they are released." This should be changed to read 1250 F.

Iron and Steel Exposition

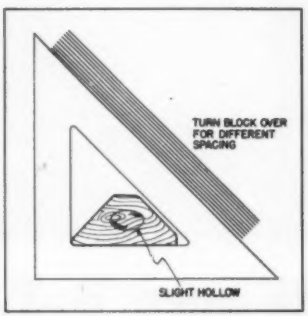
COMBINED WITH the Iron and Steel Exposition, to be held in Cleveland Public Auditorium, September 30 to October 3, will be the technical sessions of the Association of Iron and Steel Engineers Convention.

Open to everyone attending the Exposition, the technical sessions will include programs devoted to various phases of steel production: electrical, lubrication, operating practice, rolling mill, training, standardization, mechanical and combustion.

No registration fee is required for persons associated with the iron, steel and allied industries. Tickets will be widely distributed throughout these industries, and also are available, upon request, from AISE headquarters, 1010 Empire Bldg., Pittsburgh 22, Pa.

Another Idea on Cross-Hatching

ONE METHOD of cross-hatching was presented in the April 1952 issue, on page 50 of the MAINTENANCE AND OPERATION section. The following sketch shows method suggested by C. A. Lee, Evanston, Illinois.



Rest finger on block held against one side of open area of triangle. Next, draw a line. After this, hold block and slide triangle. After drawing second line, hold the triangle and slide block

Industrial Engineering Conference

THE FOURTH Annual Industrial Engineering Conference will be held at Michigan State College, East Lansing, Michigan, from September 8 to 12th. The 1952 Conference will be based on the theme, "Industrial Engineering—the Key to a Dual Economy."

The program this year will consist of a General Conference to be held on Monday and Tuesday, covering the following topics to be presented by nationally known leaders in their respective fields: The Challenge of a Dual Economy; The

(Continued on page 6)

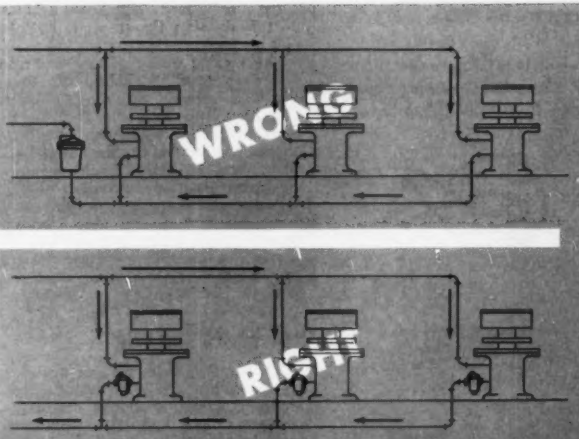
Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R. authorized by Post Office.

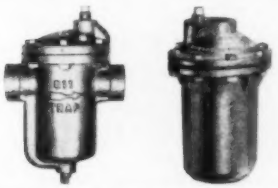
A good trade: How 50 Armstrong traps saved 14 tons of coal per month . . .

User changes from Group Trapping to Unit Trapping

THE drawing labeled "wrong" shows a group of presses drained by a single trap. With this hook-up, condensate and air from one or more presses may fail to reach the trap because even the slightest pressure difference between the units will cause a back flow from a higher pressure unit to a lower pressure unit.

The drawing labeled "right" shows unit trapping, each press drained by a single trap.





Armstrong Steam Traps are available in side inlet-side outlet or bottom inlet-top outlet body styles to best meet your piping requirements.

View of a battery of individually-trapped clothing presses at M. Wile & Company, Buffalo.

AN EXAMPLE of the benefit to be gained from Armstrong Unit Trapping is found in installation at M. Wile & Company, Buffalo, N.Y., clothing manufacturers.

A single steam trap was being used to drain each group of 4 to 6 pressing machines. After changing over to the use of an individual Armstrong trap on each of the fifty presses in the plant, the company reports that, because of the resulting more efficient use of steam, coal consumption dropped by 14 tons a month. There was no reduction in work load. This fuel saving when held up against an investment of about $500 in steam traps was rightly considered *a good trade.*

There are other advantages to Armstrong Unit Trapping. Almost invariably machine temperatures are higher, heat-up is faster and output is increased. The traps themselves are thoroughly reliable, seldom need attention. The design, materials and workmanship in the trap mechanisms for low and medium pressures are identical to those used in Armstrong traps for power plant service at 900 degrees F and 950 lbs. pressure, so they last for a long, long time.

Your local Armstrong Representative will be glad to discuss the savings possible in your plant through Armstrong Unit Trapping. Call him, or write:

ARMSTRONG MACHINE WORKS

912 Maple Street • Three Rivers, Michigan

You Always Get Greater Efficiency When You Use Armstrong Unit Trapping

FREE
44-PAGE
STEAM TRAP BOOK
Gives Complete Details

JUST CLIP TO YOUR COMPANY LETTERHEAD AND MAIL

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Please send me a Steam Trap Book.

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Industrial Engineering Conference

(Continued from page 4)

Role of Industrial Engineering in a Dual Economy; Motion Economy means Lower Costs; Time Study is the Key to Profits; Materials Handling can be Reduced; Setting Up a Cost Reduction Program; and Putting your Ideas to Work.

The second phase of the program will consist of Workshop Meetings and will be held on Wednesday, Thursday and Friday. The Workshop Meetings will each tackle a phase of Industrial Engineering. Each group will be small, 25-30 persons, led by a qualified discussion leader.

Persons interested in obtaining more information on this Conference should contact Industrial Engineering Conference, Continuing Education Service, Michigan State College, East Lansing 14, Michigan.

New Plants Going Up

Arthur D. Little, Inc., is building a new plant in West Cambridge, Massachusetts, to house its engineering offices and the mechanical facilities of its mechanical division . . . **Pennsylvania Salt Mfg. Co.** is building an addition to its plant at Montgomery, Alabama . . . **Koppers Co., Inc.,** is constructing a tar products plant at Fontana, California . . . **American Potash & Chemical Corp.** will start construction of a research laboratory in Whittier, California . . . **National Container Corp.** is constructing a new paper mill at Valdosta, Georgia . . . **Yeomans Brothers Co.** has completed construction on its new plant in Melrose Park, Illinois . . . **Kentile, Inc.** is constructing a new building next to its present plant in Chicago, Ill.

CMP Regulation 5 Amended

EFFECTIVE IMMEDIATELY, the amendment to CMP Regulation 5 (as amended June 25, 1952), which governs the procurement of maintenance, repair and operating items, accomplishes the following:

1. Removes the $1,000 limitation on the cost or quantity of materials used for a single installation project, but retains the quarterly restrictions on expenditures for installations. NPA points out, only the actual cost of materials used to install equipment in a plant need be charged against the installation quota.

2. Changes the definition of installation to include any setting up or relocation of machinery, fixtures or equipment which does not occur in conjunction with a construction project covered by CMP Regulation 6, and which is carried by a person as capital according to his established practice.

3. Provides that where an installation is made in a building which has been completed less than a year and where the installation is part of a construction project, it may not be considered as an installation within the meaning of the new definition.

4. Revises the definition of "minor capital additions" to make it clear that all items purchased as part of a single project or plan constitute one addition.

5. Requires persons who have historically treated installation or relocation as an operating supply to continue to do so.

Additional information on this amendment may be obtained from the Dept. of Commerce field offices.

'ROUND ABOUT

Plant Engineer Club Activities

Boston: At their annual meeting before the summer vacation the Boston Plant Engineers Club combined a special outing of golf, bowling, dinner and social period for the club members and guests. Everybody had an enjoyable time.

The new officers of the Boston Plant Engineers Club for the coming year will be: **Edward W. Benner,** American Sugar Refining Co., president; **John J. Coffin,** Towle Mfg. Co., vice president and chairman of programs; and **Byron A. Engelbach,** New England Confectionery, secretary-treasurer.

Dayton: At the June 5th meeting of the Dayton Plant Engineers Club, the annual election was held and the following officers were elected: **Charles W. Wright,** Delco Products Div., of GMC, president; **Vernon Kahl,** Moraine Products Div. of GMC, vice president; and **M. B. Proctor,** The Leland Electric Co., secretary-treasurer.

Would You Like to Be an Editor? We Need Another on Our Staff!

THERE IS an opening on Technical Publishing Co's. editorial staff for a young man of around 30 yr of age who has a good personality and common sense and who likes to meet people, travel and write. He does not have to be a gifted author but must be able to write clear and concise English. He should have: an engineering education; and experience in plant maintenance and power engineering. If you qualify and are interested write (strictly confidential) The Editor, PLANT ENGINEERING, 110 South Dearborn Street, Chicago, Illinois.

PLAN TOMORROW'S CHARGING ROOM TODAY!

This free 20-page booklet showing efficient, charging room layouts is just what you need to put system into your battery charging operations. It's the latest addition to the vast fund of technical information available to you under the Gould Plus-Performance Plan. Shows how cranes, hoists, battery stands, charging equipment and stations can be located in any size room for maximum efficiency, handling speed and safety. You'll need it tomorrow . . . so send for it TODAY.

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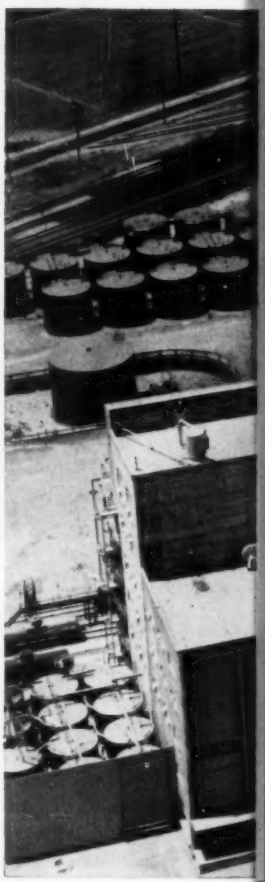
Always Use Gould-National Automobile and Truck Batteries

PLANNED POWER PAYS

Electrical shutdowns eliminated in new Lever Brothers plant



Continuity of service is extremely vital to the processing of soap, detergent and edible oils at the new 25-million-dollar Lever Brothers plant in Los Angeles. Many operations are continuous. Even a short interruption can be costly.

Based on this factor, Bechtel Corporation, the engineers and constructors, assisted by Westinghouse, specified a secondary network system. It contains six interconnected power centers that maintain service even though a primary feeder may be faulted. Secondary faults are isolated quickly. The most complete service continuity is assured. And important, too: the initial investment was only 2% more than the *least* expensive system considered.

Careful planning has also taken full advantage of the flexibility of the network system. Future loads and additional capacity can be accommodated easily and economically.

In addition, the inherent flexibility of Westinghouse Power Centers has been utilized fully. Lower maintenance becomes a reality since these standardized units have interchangeable parts. Their Westinghouse Dry-Type Transformers allow them to be located safely anywhere in the plant.

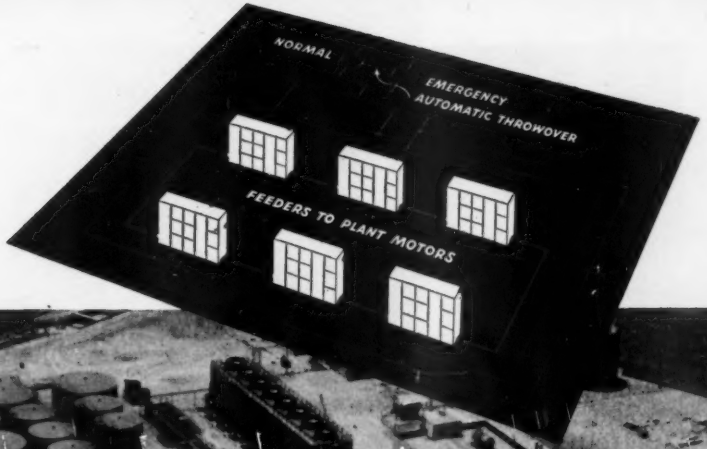
Consider this: It takes *sound planning* and *co-ordinated equipment* to provide modern distribution systems, capable of meeting your plant's power needs today and in the years ahead. Westinghouse offers you *both* . . . backed by years of experience, gained throughout all industry.

A call to your nearest Westinghouse office will bring an application engineer—well qualified to discuss your system problems with you and your engineers. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94953

YOU CAN BE SURE... IF IT'S

Westinghouse

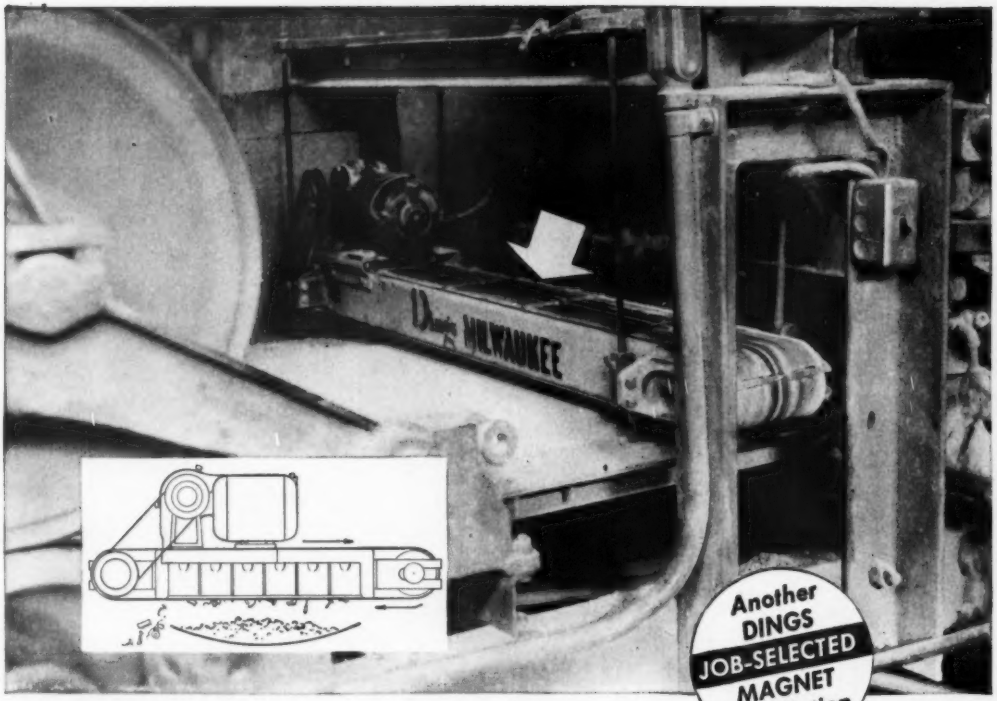
SYSTEM PLANNING



Above diagram shows two incoming sources of power which serve the main 4,160-volt Westinghouse Switchboard. Power failure on the primary source automatically throws in the emergency power.

Right: Standardized Westinghouse Power Center is interconnected with five others in the secondary network system. Complete service continuity is assured.

Left: Unitized Westinghouse Control Centers have special enclosure. This solves exposure problem during daily operation and hosing down.



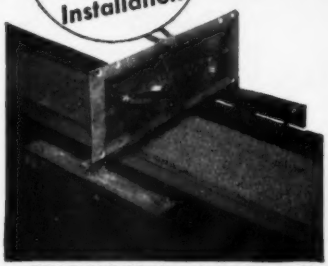
ASBESTOS MINUS IRON EQUALS SALES GOLD

DINGS MAGNETS DO THE SUBTRACTING

HOMEOWNERS like the superior quality of asbestos shingles but if the shingles don't look like wood, they won't buy, says one of the biggest manufacturers of asbestos building materials in the business. So the shingles are passed through engraving rolls to give them the textured appearance of wood. A problem raised by this process and solved by a Dings self-cleaning non-electric Perma-Plate magnet (big illustration) is TRAMP IRON—nuts, bolts, wires, etc. which get in the asbestos during previous processing. This iron would wreck the rolls, alter the pattern and eventually cause rust spots in the installed material. The Perma-Plate gets it all out—automatically.

WHY was the Perma-Plate selected for this job over all other types and styles of magnets in the Dings line? *The specific application dictated its choice.* The magnet was "job selected." Whatever YOUR tramp iron problem, buy a Dings job selected magnet and KNOW it will be successful.

DINGS MAGNETIC SEPARATOR COMPANY
4766 W. Electric Ave., Milwaukee 46, Wis.

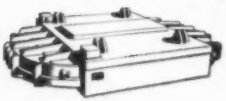


THE PERMA-PLATE (shown here without self-cleaning attachment) is non-electric, permanently magnetic. This magnet is particularly effective where the burden depth does not exceed 3".

THIS CATALOG HELPS YOU TO "JOB SELECT" A MAGNET

Is the material you want de-ironed a solid . . . semi-solid . . . liquid? Is it carried in chutes . . . ducts . . . conveyor belts? Catalog 5000-B lists Dings complete line by application, describes all Dings magnets from the low cost, non-electric "Perma" Plate magnet to the most powerful magnetic separators known. Send for it today.

DINGS MAGNETS

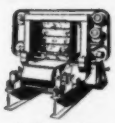


Rectangular

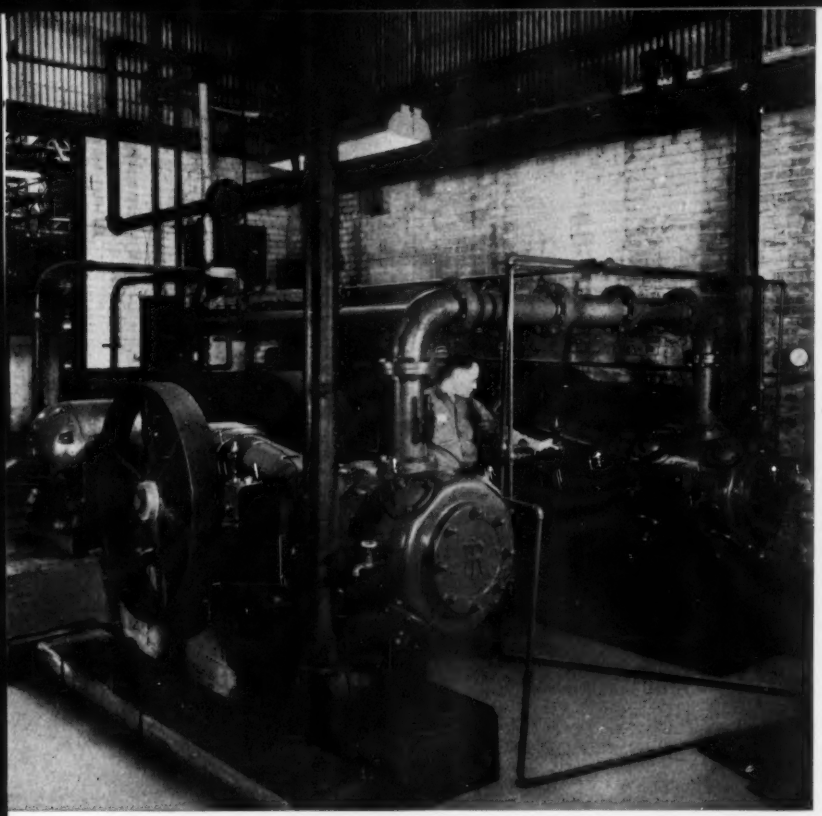
High Intensity Induced Roll

Non-Electric and Electric Pulleys

Non-Electric Drums



High Intensity Type EBK Crossbelt



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You'll find the means to significant savings in this booklet. It describes the important qualities of STANOIL Industrial Oil and the resultant benefits which have made this multi-purpose oil the choice of midwest manufacturers for a host of important lubricating jobs. Discover how STANOIL will give you superior protection through its unique combination of six outstanding characteristics, including high stability and effective rust prevention. Find how STANOIL can simplify stock, storage, and inventory in your plant by replacing special-purpose oils in hydraulic systems, speed reducers, air compressors, machine tools, electric motors, auxiliary turbines, and a wide variety of circulating, bath, and bearing systems. Ask the Standard Oil lubrication specialist from your nearby Standard Oil office for this booklet, or write: Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago.

Compressors give carbon the air

• When carbon formed on the valves of these air compressors and the oil in the crankcases had to be changed frequently, operators of this Midwest plant called in a Standard Oil lubrication specialist. He recommended STANOIL Industrial Oil, a multi-purpose oil having a low carbon-forming tendency and containing effective oxidation and corrosion inhibitors. With STANOIL, the compressors gave the air to carbon troubles and have breezed through four years of hard operation without difficulty. Over the oil previously used, STANOIL has given four times longer service in the crankcases. These results . . . similar to the results you may expect . . . have led to the use of STANOIL in other equipment in this plant.

STANOIL
TRADE MARK
Industrial Oil

Find how this multi-purpose oil can benefit you by discussing it with a Standard lubrication specialist. You can contact him by phoning your local Standard Oil office.

Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (STANDARD) *(Indiana)*

BWC Lectrodryer at left is DRYing gas down to-40° F. dew point after it has been cooled in gas refrigerator at right.

Caterpillar keeps controlled atmospheres on Tap

and Lectrodryers keep the atmospheres Dry

In Caterpillar's modern heat-treat department, controlled atmospheres are literally kept on tap. Gas from Neutralene generators passes through Lectrodryers* for DRYing and is then piped throughout the vast building.

Eliminating the WETth that threatens quality or costs—or both—is the job that Lectrodryers do for you continuously, automatically, economically. If you have a DRYing problem of any kind, Lectrodryer engineers will help you solve it. Just write Pittsburgh Lectrodryer Corporation, 333 32nd St., Pittsburgh 30, Pa.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
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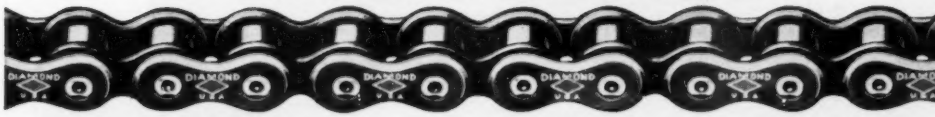
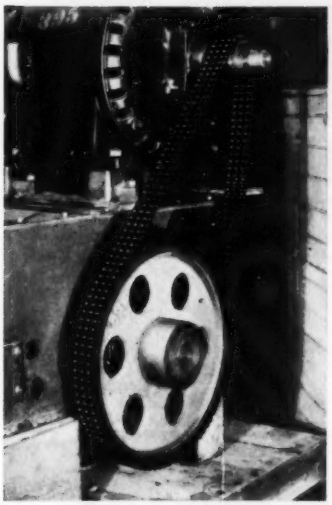
Send for Bulletin 216
"Because Moisture Isn't Pink"

LECTRODRYER

* REGISTERED TRADEMARK U.S. PAT. OFF.

Release Maintenance Men for Other Essential Jobs





Diamond multiple-strand Roller Chain Drive to reduction unit on screw conveyor.

USE LONG-LIFE MACHINERY DRIVES

Drives that require less servicing, less adjusting, less replacing can be the means of releasing some of your maintenance men for other essential production jobs.

Diamond Roller Chains for motor and machinery drives provide long-life service, they transfer power with maintained efficiencies of 98-99%, without friction, slip or creep . . . They keep output at the maximum rate you select.

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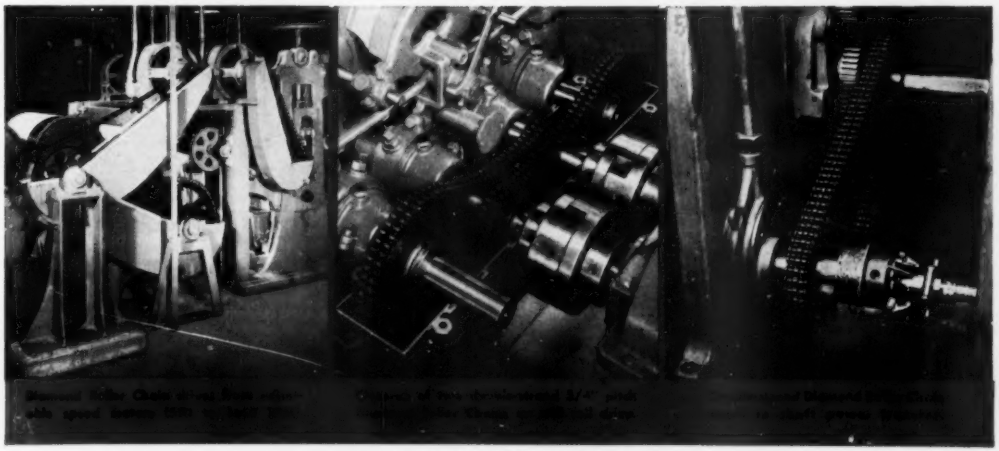
Offices and Distributors in All Principal Cities

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER



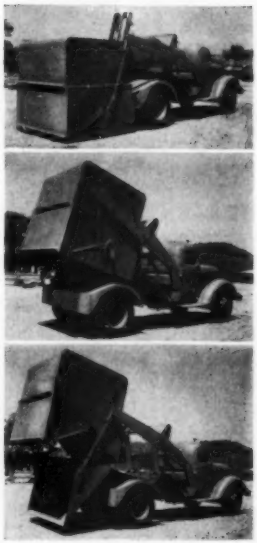
One DEMPSTER-DUMPSTER Serves Scores of Containers . . All Designs . . . All Sizes . .

Handling Materials of Almost Every Description at the Lowest Possible Cost!

One Dempster-Dumpster mounted on one of your trucks serves any required number of big detachable Dempster-Dumpster Containers spotted at convenient materials accumulation points inside and outside your buildings. The capacity of these containers range up to four times greater than the average dump truck body. They are built in a wide variety of designs best suited to the materials handled—be they solid, liquid or dust . . . trash or rubbish . . . bulky light or heavy. The truck-mounted Dempster-Dumpster, with only one man, the driver, picks up one pre-loaded container after another, hauls it to destination where materials are dumped or load set down intact. The Dempster-Dumpster may handle raw materials on one haul, liquids on another, trash and rubbish on another, etc. It's like having one truck with 15, 25, 65 or 100 different bodies.

This is the *Dempster-Dumpster System*—the modern method of bulk materials handling. It is saving thousands of dollars annually for hundreds of plants in every type of industry because it: Eliminates 3 to 5 conventional trucks and crews—reducing cost of truck equipment and operation accordingly. . . Eliminates standing idle time of trucks and crews. . . Eliminates re-handling of materials. . . Increases efficiency, sanitation and good housekeeping.

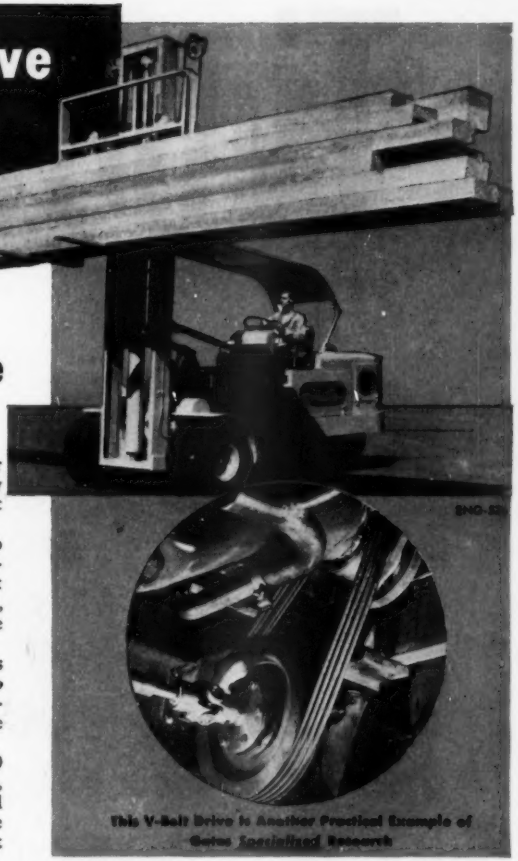
The *Dempster-Dumpster System* is, without question, the most efficient method of materials handling by truck ever devised! More efficient and lower cost materials handling in your plant may be simply a matter of getting the minds of your engineers and ours together. Write us now. The *Dempster-Dumpster System* is manufactured exclusively by Dempster Brothers, Inc.



WHEN A CONTAINER is full, the Dempster-Dumpster picks it up, hauls it to destination and dumps the materials or sets the load down intact. These three simple operations, shown above, are hydraulically controlled by driver in truck cab.

DEMPSTER BROTHERS - 182 Shea Building - Knoxville 17, Tennessee

Unique 4 Belt Drive Fits 2¼" Space



This V-Belt Drive is Another Practical Example of Gates Specialized Research

Transmits 34 h. p. to Operate Hydraulic Controls . . .

Unless they made costly changes, the Gerlinger Carrier Co., makers of big fork lift trucks, had only 2¼" on the crankshaft available for the hydraulic pump drive.

A standard V-Belt drive to carry a load up to 34 horsepower would have required 5½". It appeared that a chain drive was the only type that could handle the load and fit the space. Early trucks, therefore, were equipped with chain drives on the hydraulic pumps.

In service, however, chains gave trouble. It was impractical to encase them and their speed was so high (3000 ft./min.) that they threw off all lubricants, and wore out rapidly. Gates engineers were asked for a solution.

Drawing upon a background of more that 20 years of *Specialized* Research in V-Belt engineering, Gates engineers worked out a drive using four small specially designed V-Belts. This drive fits into the crowded space between engine and fan belt and yet has ample capacity to handle the heavy load.

V-Belt drive has many advantages

Unlike the chain drive, V-Belts require no lubrication, yet are quiet and positive and the multiple strands are an advantage because they assure uninterrupted operation. If one belt breaks, the others continue to carry the load until replacement can be made. A further advantage is that the early lift trucks can be equipped with the new drive at a minimum cost.

This is another example of the practical value of Gates engineering know-how applied to a critical design problem. Only rarely, of course, are special V-Belts required to solve such a problem, but the same engineering skill and experience is available to you—right in your own plant—for the solution of *any* power transmission problem you may have.

Phone for a Gates Field Engineer

Whenever you have a difficult drive to design—or if some difficulty develops on any drive in your plant or if you only want to know what V-Belts to use for the most efficient, lowest cost service on any particular drive—just pick up your phone book and call the number listed under "Gates Rubber."

A Gates field engineer will call on you and put at your service all the facilities of Gates *Specialized* Research on V-Belts—*without the slightest obligation.*

There are Gates engineering offices and jobber stocks in all industrial centers of the U.S. and 71 foreign countries.

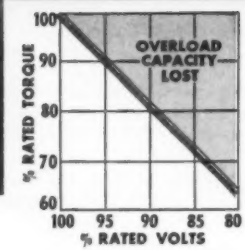
The Gates Rubber Company • Denver, U.S.A.

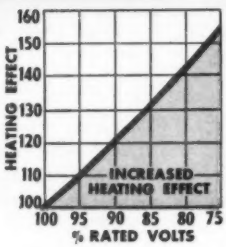
®

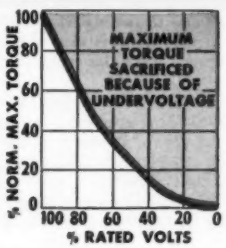
The World's Largest Maker of V-Belts

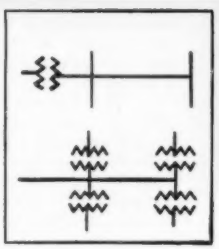
Gates VULCO ROPE DRIVES

Time-Study









FULL PRODUCTION demands that rated voltage be maintained to all motors. Overload capacity, that extra push necessary for short intervals on many processes, falls off rapidly on undervoltage . . . falls approximately 10% for every 5% drop below rated voltage.

MOTORS BURN OUT quicker at undervoltage because of increased heating effect. Overload relays in the controls protecting your motors trip because of the extra current through them, open circuits to motors — cause machine down-time and production loss.

JOBS TAKE LONGER because torque and horsepower drop when voltage drops. Less torque means lighter cuts on lathes, shapers and other machine tools. More time must be spent to get the same job done. More overhead, more manhours must be figured into every job.

A MAJOR CAUSE of undervoltage is voltage drop in secondary feeders. Existing systems may not be adequate for new production schedules. Install A-C Substations at load centers to reduce line losses, cut feeder length, hold proper voltage, increase production.

Your Voltage

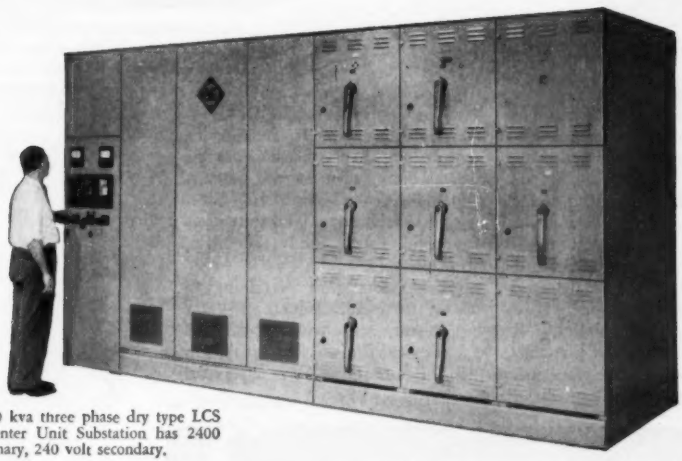
STOP WASTING MANHOURS on slow producing machines. Get the most from the production equipment in your plant by installing unit substations to correct undervoltage. No electrical equipment gives top performance *unless* it operates at rated voltage . . . and even well designed distribution systems may prove inadequate because of today's added loads and increased production schedules.

For example, if your squirrel-cage motors operate at 10% undervoltage, maximum torque available to start machinery is reduced 19% . . . heating effect within the motors is inceased 21% . . . overload capacity falls, efficiency drops.

Increase your output by eliminating production slow-downs resulting from overloaded motors . . . machine down-time due to tripped starters or circuit breakers. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate excessive line drop by shortening low voltage cables. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install, and provide protection to personnel.

You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution system. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for bulletins 11B6285A, 11B6325B and 11B6895. A-3371

LCS
Unit Substation



This 750 kva three phase dry type LCS Load Center Unit Substation has 2400 volt primary, 240 volt secondary.

ALLIS-CHALMERS

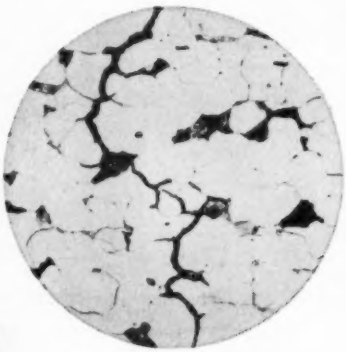
TECHNICAL SERVICE for your plant water problems

Hall Laboratories' specialist studies a specimen on a metallographic microscope. This modern instrument is an example of the equipment Hall Laboratories utilizes in seeking the answers to your plant water problems.

The metallographer focusing this precision microscope-camera is taking one step toward solving a plant water problem. The structure of damaged metal often is an important factor in determining the cause of failure or poor performance. Stress-corrosion, caustic embrittlement and overheating can be detected by this method. The evidence, in conjunction with Hall Laboratories' other modern techniques, helps clients solve industrial water problems.

You can profit by Hall Laboratories' wide experience and modern equipment. Every phase of the use and disposal of industrial water is included in the scope of Hall Service and facilities for all industries —metal, paper, power, chemical, for example.

For information pertaining to your particular Industrial Water problems, write, wire, or call Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pennsylvania.



Photomicrograph of the typical intergranular cracking of caustic embrittlement. The metal was damaged by concentration of alkaline boiler water at a leaky tube end.

HALL LABORATORIES, INC.

Remember the trade marks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS, INC.

Streamline your purchase of welding fittings

Scrappy says, "Aid defense—more scrap today... more steel tomorrow."

Write Dept. D-8 for free booklet listing properties of pipe and welding fitting and flange materials.

JUST AS THE USE of welding fittings streamlines a piping system so does the standardizing on TUBE-TURN Welding Fittings streamline your purchasing operations.

The TUBE-TURN Welding Reducer, both in the concentric type shown here and the eccentric type, is available in a complete range of sizes, wall thicknesses and types of materials. This is another example of how the complete TUBE TURNS' line is designed to meet all your requirements. It covers over 4000 different items. Thus you can simplify ordering and deliveries for any piping job by obtaining all your welding fittings and flanges from one reliable source . . . your TUBE TURNS' Distributor. You'll find one in every principal city.

Be sure you see the double "tt"

TUBE TURNS, INC. LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Chicago • Houston • Tulsa • San Francisco • Los Angeles
TUBE TURNS OF CANADA LIMITED, CHATHAM, ONTARIO... A wholly owned subsidiary of TUBE TURNS, INC.

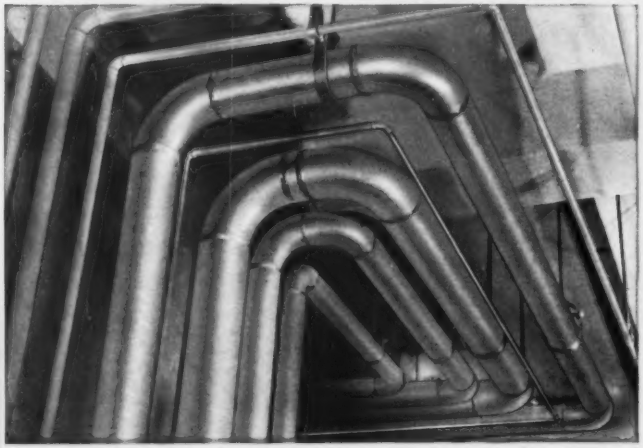
IN THE NEW ALCOA BUILDING

30 Stories of New Building Ideas
...includes maintenance-free welded piping

ALUMINUM COMPANY OF AMERICA's new 30-story office building in Pittsburgh is a pacesetter for construction ideas. Exterior walls are made of sheet aluminum. Windows pivot on vertical axes to simplify cleaning. Radiant heating and cooling panels in ceilings increase rentable floor space.

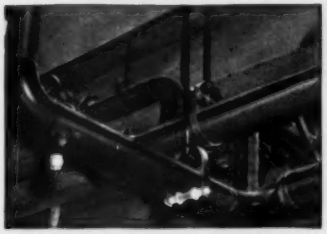
In keeping with this progressive design, a welded piping system, using TUBE-TURN Welding Fittings and Flanges, was specified. Thus piping, both aluminum and steel, will be leak-proof and maintenance-free. The variety of welding-fitting requirements posed no problem, since TUBE TURNS, INC. offers the world's broadest line of welding fittings and flanges—available in a wide range of types, sizes, and more than 40 different metals and alloys.

Alcoa's new office building. Architects: Harrison & Abramovitz. Assoc. Architects: Mitchell & Ritchey and Altenhof & Bown. Heating, Ventilating & Air Conditioning Sub-Contractors: Drave Corp.; Plumbing Contractors: Sauer, Inc.



Corrosion-resistant aluminum lines for drinking, and hot and cold water supply saved critical copper. Note how welded lines, from 1" up, are fitted closely together, make for a neat installation. These lines will be insulated.

TUBE-TURN Welding Elbows, Tees, and Reducers used in steel piping for steam and hot water lines in basement. True circularity and uniform wall thickness of TUBE-TURN Welding Fittings expedited installation by insuring accurate fit.



Eight-inch steam line with 2" and 3" branches in fan room on roof. Use of welded system, with TUBE-TURN Welding Fittings, simplified piping design, gives streamlined appearance, eliminates maintenance problems.

TUBE TURNS, INC., Dept. D-8
224 East Broadway, Louisville 1, Kentucky

Your Name .....

Position .....

Company .....

Nature of Business .....

Address .....

City ..... *State* .....

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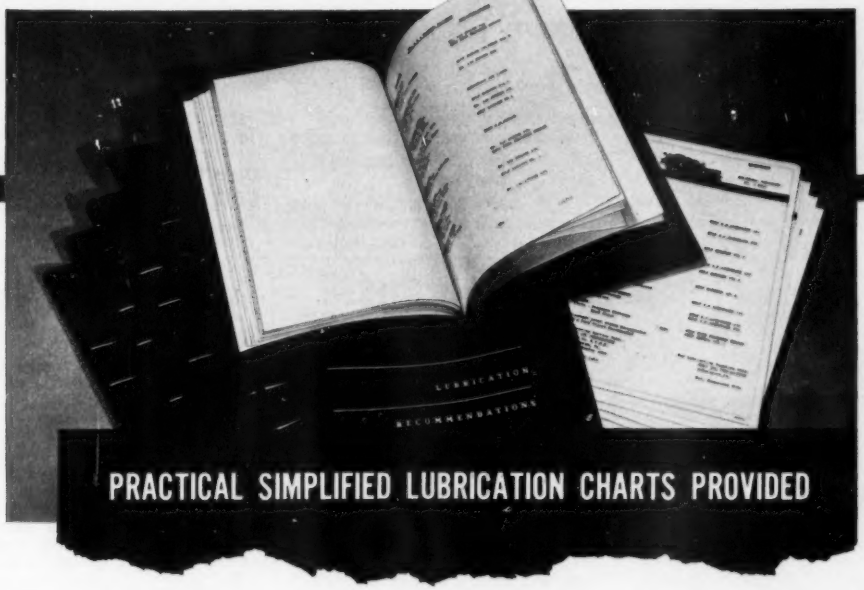
"tt" and "TUBE-TURN" Reg. U. S. Pat. Off.

TUBE TURNS, INC.

LOUISVILLE 1, KENTUCKY

NUMBER 4 OF A SERIES

How Gulf Periodic Consultation Service helps plants cut lubrication and maintenance costs



You'll find a Gulf Lubrication Engineer does more than simply recommend the proper oils and greases for every type of equipment in your plant. He offers effective help on every phase of lubrication!

After he has completed a survey of your plant equipment and operating conditions, for example, he will offer two types of lubrication aids. The first, a master lubrication chart in book form which is to be retained in the maintenance office, contains an itemized list of all your equipment together with recommended Gulf lubricants and methods of application.

The second, a group of plastic bound wall charts, is provided for each department or section. These durable charts are used in or near the department or section to which they apply.

This system has proved to be very practical without being cumbersome—the oilers have a permanent, convenient reference chart near the point of lubricant application, and their supervisors have an effective means of controlling the over-all picture.

For additional information on this cost-saving plan, call in a Gulf Lubrication Engineer today or send the coupon below.

GULF SERVES INDUSTRY

Gulf Oil Corporation · Gulf Refining Company PE
719 Gulf Building, Pittsburgh 30, Pa.

Please send me, without obligation, a copy of the booklet "Gulf Periodic Consultation Service."

Name.....

Company.....

Title.....

Address.....

Panel discussions on how casters help reduce the **"Reducible 30%"***

MATERIALS-HANDLING FORUM

Write us how you've used casters to solve specific handling problems. $25.00 will be paid for material used.

A SERIES PUBLISHED BY BASSICK, WORLD'S LARGEST MANUFACTURER OF CASTERS AND FLOOR PROTECTION EQUIPMENT

CASTER LOAD CAPACITIES DEPENDENT ON FLOOR AND OPERATING CONDITIONS

Speed of Travel, Condition or Type of Operating Surface, Manual or Power Operation Important Factors

All these variable factors must be taken into consideration when ordering casters from the load capacity data given in caster catalogs.

It should be understood that such data can only be an approximation. Casters of similar size and type are rated differently by different manufacturers. Bassick, with a reputation to maintain as world's largest caster maker, protects its customers by making its ratings conservative. However, the best protection from the dangers of overloading is to be thoroughly familiar with the following facts.

SOFT RUBBER-TREAD WHEELS HAVE LIMITS

Don't expect a rubber-tread wheel to carry the same load as a metal or hard-tread composition wheel of equal size. Figure the rubber-tread wheel will carry about 50% as much.

For example, Bassick's popular, high-quality, double-ball race, swivel caster No. H6991-2 (bottom) is load-rated at 650 lbs. with a 6 in. x 2 in. semi-steel wheel. The same caster, when supplied with a 6 in. x 2 in. aluminum core *rubber-tread* wheel, No. H6993R-2 (top), is load-rated at 350 lbs.

Too often someone will replace metal wheels with rubber treads and complain that the equipment is hard to move. Rubber-tread wheels protect floors, but will not give the same ease of rolling as a hard wheel of equal size.

FAST TRAVEL CUTS CARRYING CAPACITY

The caster shown above, No. H10931-2, a 10 in. heavy-duty model, will carry a static load of over 80,000 lbs., but nowhere near that load in action. Hence, this precision Bassick "machine tool of motion" is rated at 10,000 lbs. It's ideal for heavy units on production lines, and moving or positioning heavy machinery. It is not designed for speed.

POWER-PULLED TRAILERS HAVE SPECIAL CASTER NEEDS

The caster just discussed would not stand the strain of serving on a power-pulled trailer where speeds may reach 5-10 miles an hour. A specially-designed caster is needed—like this No. 10TS1-2, Bassick's 10 in. trailer type swivel number, load-rated at 2,000 lbs.

Consider floor surface in determining load

Don't worry too much about overloads if floors are fairly smooth and travel areas free from obstacles. In such a case, the No. H6991-2 would carry 750 lbs. very satisfactorily, though rated for 650 lbs. But if operating conditions are rough, use casters and wheels rated above the maximum loads anticipated. A wheel large enough to easily ride over obstacles should be selected. The larger the wheel, the easier the equipment will roll.

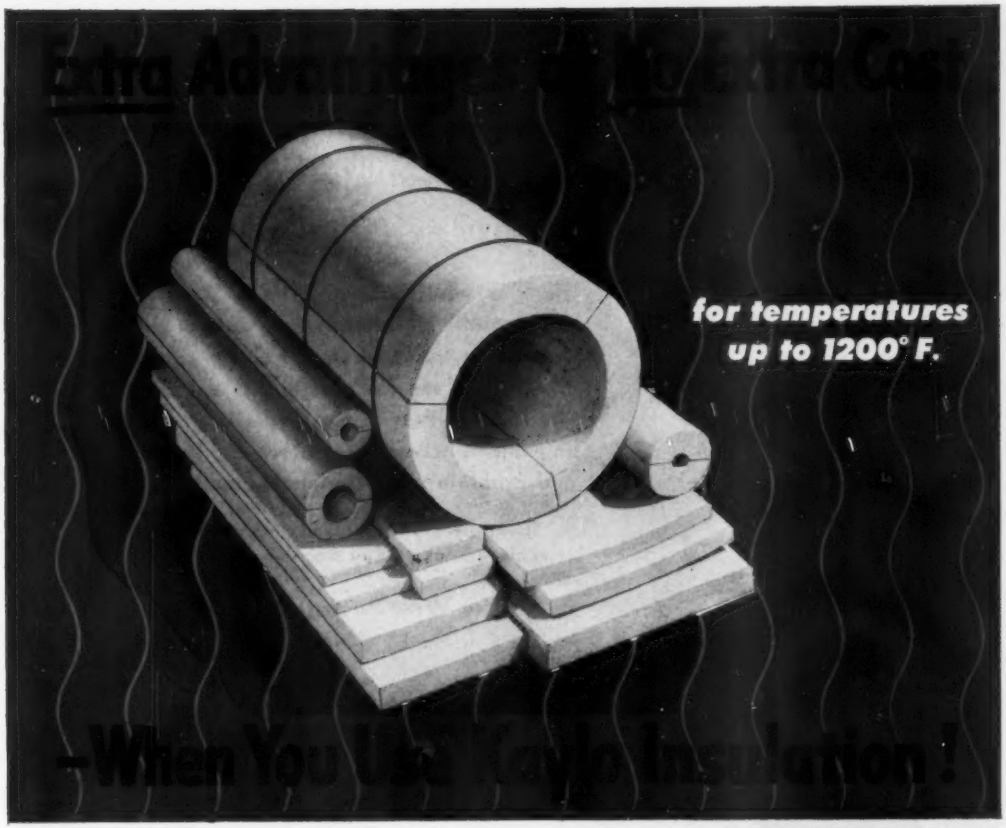
Full details available on request

Write for Catalog 124A for load capacities of Bassick Casters and Wheels. Satisfied users mean more to us than immediate orders. That's why our ratings are conservative—based on tested average normal operating conditions. Bassick Casters are sold by carefully-selected, local industrial supply distributors. THE BASSICK COMPANY, Bridgeport 2, Conn. *In Canada:* Belleville, Ont.

*According to cost analysts, materials-handling (about 30% of total cost) affords about the only real opportunities for cost reduction today.

Bassick — A DIVISION OF STEWART WARNER

MAKING MORE KINDS OF CASTERS... MAKING CASTERS DO MORE



For example, Kaylo Heat Insulation reduces inventory requirements because:

1. Wide effective temperature range—up to 1200° F.—eliminates the need for combination coverings in nearly all operating conditions.

2. Simplified Dimensional Standards allow nesting.

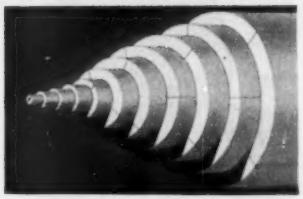
3. Unmatched selection of shapes and sizes reduces the number of pieces required per job.

Kaylo Heat Insulation reduces installation costs because:

4. The material is lightweight, strong and easily handled.

5. It is easy to cut and fit with standard tools.

Kaylo Heat Insulation is a hydrous calcium silicate—the heat-saving material that is revolutionizing insulation practice with its outstanding combination of advantages. Get all of the facts now.



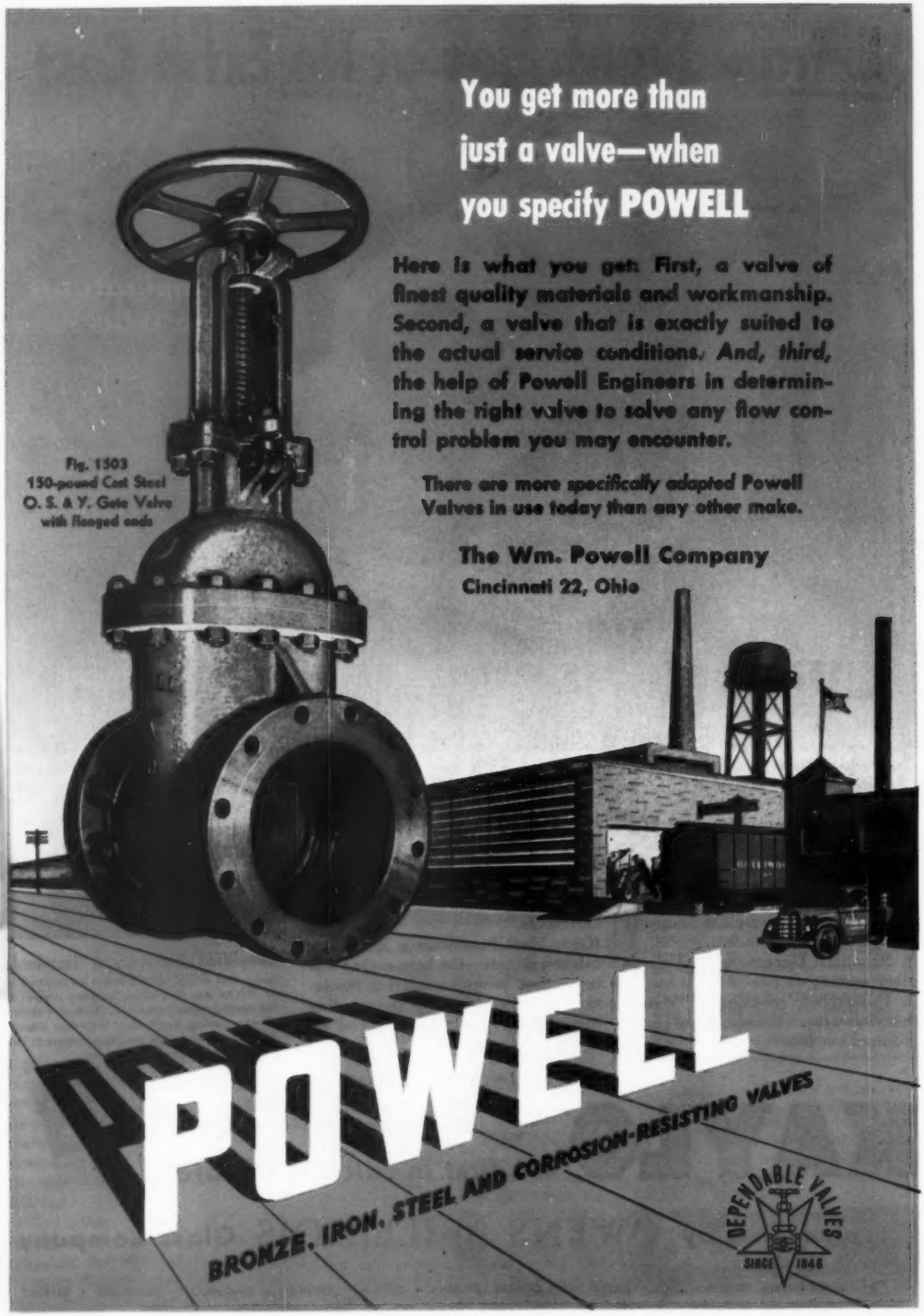
Simplified Dimensional Standards mean that O. D.'s of insulation correspond to O. D.'s of standard pipes, assuring proper fit for nesting, when necessary. With this system of snug nesting, Kaylo Heat Insulation assures fits for all operating conditions, requires less items—reduces inventory stocks.

WRITE FOR FREE BOOK—"Kaylo Heat Insulation." Address: Dept. N-304, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

KAYLO® **... first in calcium silicate**

...pioneered by OWENS ILLINOIS **Glass Company**

MAIN OFFICE: TOLEDO 1, OHIO — KAYLO SALES OFFICES: ATLANTA • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DETROIT HOUSTON • MINNEAPOLIS • NEW YORK • OKLAHOMA CITY • PHILADELPHIA • PITTSBURGH • ST. LOUIS • WASHINGTON


You get more than just a valve—when you specify POWELL
Here is what you get: First, a valve of finest quality materials and workmanship. Second, a valve that is exactly suited to the actual service conditions. And, third, the help of Powell Engineers in determining the right valve to solve any flow control problem you may encounter.
There are more specifically adapted Powell Valves in use today than any other make.
The Wm. Powell Company
Cincinnati 22, Ohio
Fig. 1503
150-pound Cast Steel
O. S. & Y. Gate Valve
with flanged ends
POWELL
BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES
DEPENDABLE VALVES
SINCE 1846

TESTING TIPS for the maintenance of plant equipment

Lever Brothers Co. Cuts Testing Time 25% With Hook-on Wattmeter for Overload Tests

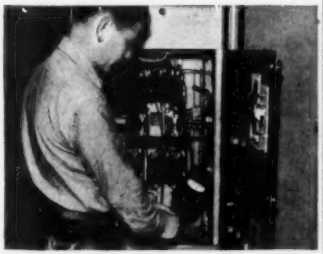
Lever Brothers Company, manufacturers of soap, edible products, and detergents, were able to cut testing time 25% by using the General Electric AK-2 hook-on wattmeter. They use the wattmeter to check power input in electrical equipment, and to check against overloads.

NO CUTTING OF CONDUCTORS

To measure power merely clamp the hook-on wattmeter around the line—no cutting of conductors, no costly shutdowns to make necessary power checks. Single-phase and polyphase circuits measured quickly and easily; in addition to kilowatts, vars in balanced three-phase circuits can be measured.

WIDE VERSATILITY

The AK-2 hook-on wattmeter can be used to make motor load tests, plant load surveys, to check resistance of electric furnaces, to measure kilowatts directly in overloaded areas, and in many other applications. The versatility of instrument is indicated by the fact that it will measure up to 300 KW, from 15-600 amperes, and from 100-600 volts—all at an accuracy of ± 5% full scale. Price: $87.00.* Order Bulletin GEC-591.



G-E Insulation-resistance Meter Cuts Rejections Due to Insulation Failure

REDUCTION OF REJECTS due to insulation failure is easily accomplished with a General Electric insulation-resistance meter.

SAFER TO OPERATE

Safer to operate, the maximum output current being limited to two milliamperes, the meter can be used wherever 115-volt, 50- or 60-cycle power is available. The meter measures insulating-resistance over a range of 0-20,000 megohms, and is extremely valuable in detecting faults during the manufacture of electrical equipment.

PREVENTATIVE TESTS NEEDED

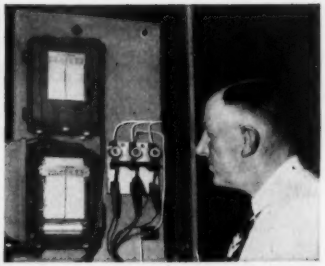
By testing insulation-resistance before making high potential tests (which are essential in many production operations), you avoid destruction of electrical equipment that has faulty insulation. High potential tests will do this if insulation is poor. The insulation resistance meter is particularly useful in testing the insulation of plant equipment—thus providing for prompt performance of preventative maintenance, which in turn reduces costly production interruptions.

EASY TO USE

The G-E insulation-resistance meter is small, compact, portable—thus convenient for production and service testing. Operated by one person, the meter is simple to use. Price: $304.20.* Write for Bulletin GEC-753. General Electric Company, Schenectady 5, New York.

*Manufacturer's Suggested Retail Price.

GENERAL ELECTRIC



Pasadena Power and Light Praises G-E Portable Recorder Flexibility

Use of the General Electric CF-1 portable recorder by Pasadena Power & Light Co., has resulted in satisfactory voltage checks, reports A. Leonard Stevenson, relay tester.

REGULATORS CHECKED

Mr. Stevenson, shown in the photo above, says that regulator relays "are checked once a month to maintain standard voltages. Located in distribution centers for circuits, our CF-1's check the regulators to see that they are correctly compensated. The recorders are used whenever a circuit cut is made for adding or decreasing power. This instrument is more accurate than those previously used—its flexibility and adaptability make it a thoroughly satisfactory instrument."

30-DAY CHARTS AVAILABLE

You can get accurate records over an extended period of time with a G-E Type CF inkless recorder. Designed for dependability and maximum convenience, it can run as long as 30 days without attention, and has a weather seal for outdoor service. Simply put it on the line; it records volts, amps, or single-phase watts—just the information you need to determine what corrective action is necessary. The CF inkless recorder has an accuracy up to ± 1½ per cent of full scale value. Price of voltmeter (0-140/280 volts): $110.00.* More details in GEC-215.

When ordering bulletins, write to Section 602-239, General Electric Company, Schenectady, N. Y.

BUY NOW

From Your Nearest G-E Distributor

making the right
choice is simple here

...but it's easy to go wrong in choosing floors

This greaseproof SPECIAL KENTILE Floor resists hot cooking greases and oils...cleans to colorful newness with minimum of effort and expense.

THAT'S WHY IT PAYS TO CONSULT YOUR KENTILE FLOORING CONTRACTOR

CHOOSING the wrong floor for a particular room or area all too often results in excessive upkeep costs...frequent repairs or replacement. That's why it is economical as well as practical to call in the Kentile Flooring Contractor.

He is an expert with years of experience in selecting the one right floor for every flooring need...from heavy duty greaseproof flooring required for working areas to the dignified flooring best suited for offices.

Whether your problem is new construction or remodeling of areas large or small, call in the Kentile Flooring Contractor and get the most for your flooring dollar. For his name look in your classified phone book under FLOORS or write Kentile, Inc., Dept. XX-3, Brooklyn 15, N. Y. In Canada, at T. Eaton Co. Ltd.

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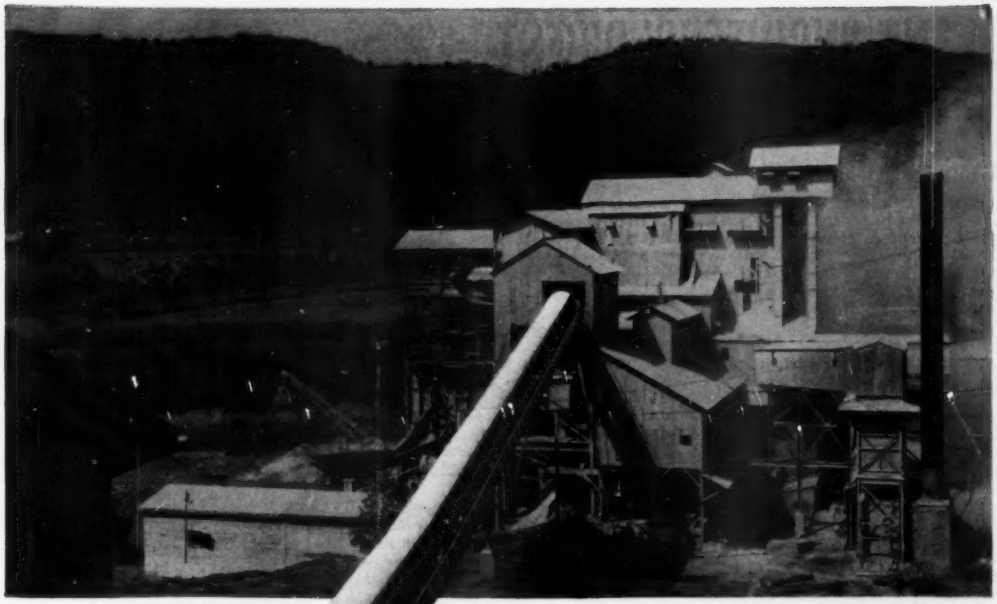
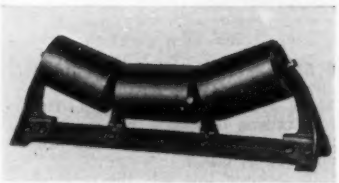


THIS JEFFREY BELT CONVEYOR

Effects Marked Modernization In This Large Limestone Plant



One of the Jeffrey 3-roll Belt Idlers, mainstay of the Belt Conveyor system. They are rugged and built to give years of reliable service. Various sizes for the job at hand.

It conveys crushed limestone (1¼"-0") up a 60-foot incline at 125 tons per hour. 500-foot center, this conveyor runs at 227 F.P.M. — 30 H. P. motor. Provides continuous operation with little maintenance.

Jeffrey engineers are constantly effecting marked modernization of material handling methods in the many fields Jeffrey is privileged to serve. It's a story of specialization . . . of painstaking "care" which has constantly attended the development of Jeffrey equipment.

Also on this job are Jeffrey Spiral Conveyors, Bucket Elevators, Feeders and allied machinery. Our engineers are in a position to help you satisfy each new demand in a practical manner. Write today.

THE JEFFREY MANUFACTURING COMPANY

1877 75 1952

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by E. B. Skubik

Lighting Maintenance Program

ONE OF THE MOST thorough lighting maintenance programs in industry has been in operation at Cleveland Graphite Bronze Co. for over 6 years. L. E. Wilson, plant engineer, and company officials report a continued high quality of illumination, continuous and efficient operation of equipment, an enviable safety record and plant cleanliness as direct results of the program.

Realization that high light output means higher production per man-hour, which in turn decreases unit cost, led to this thorough system of maintenance for fluorescent fixtures.

The maintenance program consists of three steps: 1. Daily inspection. Two inspectors working as a team check all departments daily for lamps that are "snaking" or are burned out. An immediate inspection is made to determine the cause. Burned-out lamps, an infrequent occurrence, are replaced.

2. Cleaning and lamp inspection. Six cleaners working on the third shift, clean the 11,000 reflectors every 3 months. Cleaning alone accounts for an increase of 7 to 10 ft-c at work level.

Each cleaning crew checks the lamps as they are removed prior to cleaning the reflector. On each new lamp they place a sticker on which the month and the year of the installation is marked. Lamps are normally taken out of service following a 9-month use cycle.

3. Checking footcandle ratings. Each day the chief light inspector, using a pocket meter, checks both the area that will be cleaned that night and the area that was cleaned the previous night. This daily check assures that illumination is at all times kept up to expected standards. *From See Better—Work Better Bulletin, published by General Electric Lamp Div., Nela Park, Cleveland.*

Springs Float Machine

A HUGE pneumatic hammer at RCA's Camden, N. J. plant rests on a floating 83-ton concrete shock absorbing foundation. The spring-mounted foundation acts as an anvil for the 1,000 lb head and dissipates the shock of its impact.

In accomplishing this task a 12 ft deep pit of reinforced concrete was prepared. The pit, measuring 15 ft across, houses "vibration isolating equipment." This consists of 8 spring assemblies with 9 springs in each assembly. In addition, 4 springs known as "snubbers" are utilized, bringing the total number to 76.

The spring assemblies are adjustable so that the load will be equally distributed among them when the big machine is in operation. They do their job so well that motion in the pit is not observable and vibration is reduced to an absolute minimum.

The concrete block is pierced by 4 big H-beams, which protrude on each side of the block. The 8 beam

Large hammer is being lowered in position on new spring-mounted foundation

Roof Is Raised with the Use of Precast Concrete Members to Provide Headroom for Travelling Crane

A WARTIME aluminum oxide reduction plant in Riverbank, California, remained idle since the end of hostilities. Then it was decided to put it back in production manufacturing products of steel. Before this transition could take place, certain building changes had to be considered and made.

For one thing, the steel trusses of one of the existing buildings had to be raised 27 ft to accommodate a 52-ton crane with a 72-ft span. The roof raising operation was to take place over a building measuring about 75 by 650 ft.

In tackling this job, the original steel column and trusses were taken down as a unit. Then precast concrete columns were erected. These were, in turn, tied-in with precast trusses which are welded to angle seats secured to the columns. Next, reinforced concrete crane girders weighing about 9 tons apiece were placed on top of the structural work.

With the precast concrete members securely in place, the old 20 ft steel trusses and supporting steel were erected on top of the concrete columns. This raised the truss clearance to a new height of about 50 ft.

Through the use of precast, reinforced concrete instead of steel for struts, columns, crane girders and other frame units, more than 130 tons of steel were conserved and the final completion of the work advanced several months. *From Bechtel Briefs, published by Bechtel Corporation, San Francisco, California.*

Side forms are being removed from precast crane girder. At right, crane is lowering girder in place. Steel at top of column will be welded and grouted

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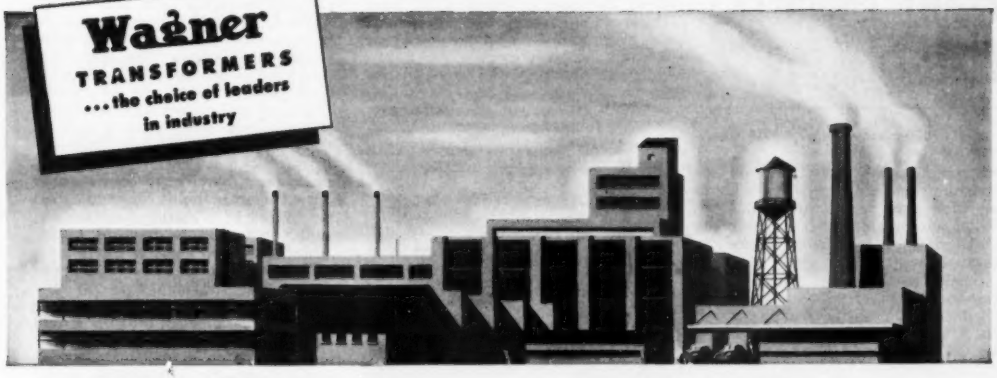

Wagner Dry-Type Transformers
...safe, efficient power distribution for your plant

Wagner Dry-Type Transformers are the answer to the problem of bringing the right voltage to load centers economically—yet with complete safety and dependability.

They can be used for a variety of purposes, such as insulating a lighting circuit from a power circuit, obtaining a 240/120 volt 3-wire circuit from a 2-wire system, operating low-voltage portable lamps, and supplying machine tool lighting from the power circuit. They are frequently used to step down power distributed at 480 or 600-volts to supply lights, portable tools and other 120-volt devices.

Wagner Dry-Type Transformers are economical—they eliminate long runs of secondary copper . . . they provide steady voltage with minimum line losses . . . they are light in weight and compact—inexpensive to install and easy to move if changes in plant facilities make it desirable.

They are safe to use—without fireproof vaults or other special protection—even where fire hazards are present.

* * *

Wagner general-purpose dry-type transformers are available in single-phase, two coil units (Type AE) in sizes 1.0 to 200 kva, 600 volts and below; and in three-phase, two coil units (Type AP) in sizes 3.0 to 300 kva, 600 volts and below. Type AA Auto-transformers are also available. Write for a copy of Bulletin TU-90. It gives many suggestions that you can use.

Thirty-two branches, located in principal cities, are at your service for consultation on transformer problems.

TYPE AE

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T52-8

PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

ends rest on the spring assembly so that the bottom of the block is about an inch from the floor of the pit. When the hammer strikes, the block sinks slightly, but never enough to touch the pit floor.

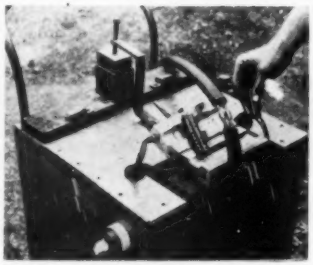
The over-all weight suspended on the springs is 111 tons, including the 28 ton weight of the machine. *From RCA Victor Family News, published by RCA, Camden, N. J.*

Speedy Cable Splicing

A NEW and economical method for quickly splicing heavy trailing cable on the job uses Vinylite resin plastisols to help restore mechanical, electric and dielectric properties of the splice. This system was developed by the Consolidation Coal Co. of Fairmont, W. Virginia.

A single operator wheels a combination workshop and supply cabinet to the scene of a cable-break and permanently splices 2 or 3 conductor cable, copper size No. 4, 2 or 1, in approximately 30 min. Trimmed cable ends are placed in a carbon mold for copper-thermit welding of both conductors. Separate cartridges, ignited with a torch igniter, are used for each conductor, but both are spliced simultaneously.

With rough runners trimmed off, the splice is ready to be wrapped in a piece of split tubing pre-formed



Preformed tubing in man's hand will separate and insulate conductors. Electrically heated mold sections appear on top of the handy cable splicing unit

of plastisol which separates and insulates the conductors.

To make the separators, heated rods of correct diameters and spacing are dipped into plastisol. Split lengthwise, the tubings are removed from the rods and cut to length as needed. Holes punched in the separator improve bonding with the finished jacket. The separator is secured with insulating adhesive tape; jacket ends are cleaned, roughened and coated with adhesive.

The spliced cable is then laid in an aluminum mold on top of a small amount of plastisol placed in the lower mold cavity to center the splice. Separate molds for each cable size consist of 2 sections, each containing two 150 w heating units. Cable brings 250 v direct current.

With the mold sections latched together over the splice, a conventional hand-operated grease gun is used to force plastisol into the mold. After curing 5 min at 325 to 375 F, the cable is removed, cooled, and excess plastisol is trimmed off. *From news release of Bakelite Co., New York, N. Y.*

Big Lathe Gets New Drive

BECAUSE of the increasing demand for heavy repair work on oil field machinery. The Miether Machine Co., Odessa, Texas, purchased a 42 in. by 21 ft engine lathe. The used machine was equipped with step pulleys and a countershaft.

To handle large diameter hoist-

Hydraulic Sheave Drives Stop Conveyer Chain Breaks and Cut Down Time on Pickling Operation

METAL PARTS for gas ranges at the Geo. Roper plant of Rockford, Ill. are processed through a series of pickling operations by means of a conveyor. The 185 ft continuous conveyor chain is driven by two 1½ hp motors, with a distance of about 90 ft between driving centers.

An automatic timer system stops the conveyor movement at predetermined intervals and "dunks" the range parts into a series of pickling tanks.

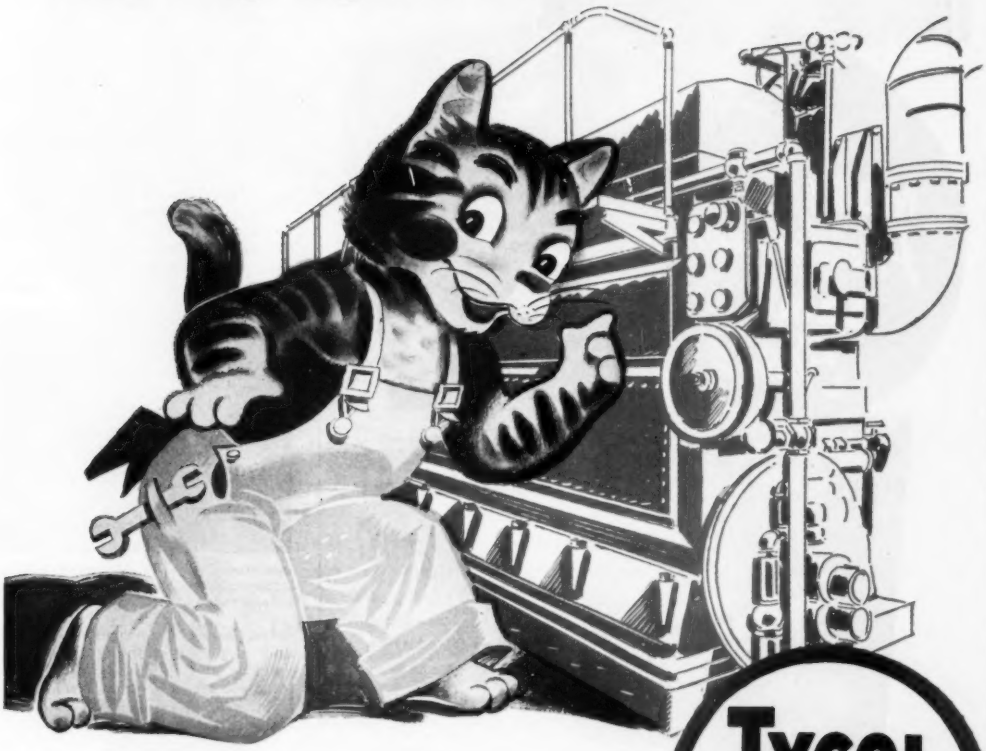
Although the two 1½ hp motors were originally matched, continuous operation with frequent starts and stops caused them to work against each other. This resulted in repeated breaks in the conveyor chain.

To remedy this undesirable condition, a hydraulic sheave drive was installed on each motor. At the same time, each motor was mounted in a raised position and changed from direct drive to a speed reducer. A 1 to 1 drive ratio was maintained between the reducers and conveyor chain.

With no change in loads or general conditions, motors no longer fight each other. Normal slip in the two couplings results in smooth operation and eliminates chain breakage. *From a report of Twin Disc Clutch Co., Hydraulic Div., Rockford, Ill.*

Chain-driven arms stop automatically over tanks and dip gas range parts. Arrow points to the hydraulic sheave drive on one of the two conveyor drive motors

"Tycol Diesel Oils give smooth performance... assure top engine service"



Absolutely correct! Tycol Diesel Oils are a must for satisfactory lubrication. Their degree of refinement – their service endurance – and their high stability mark them outstanding.

Tycol Diesel Oils have more than proved themselves after years of operation in Diesels of every description and in all types of service... from high-speed units for industrial, railway and marine uses where a heavy-duty or detergent oil is necessary to low-speed Diesels where a non-additive lubricant can be used. Yes, sir, there is a Tycol Diesel Oil scientifically engineered for every Diesel application – engineered to do the job better... at lower cost.

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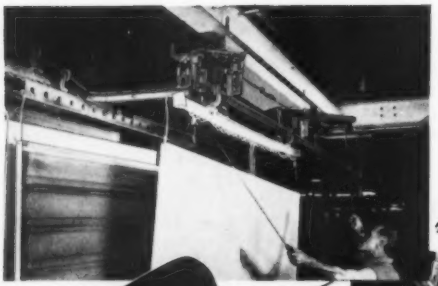

Carriers roll off power conveyor in finishing oven to crosstrack switches for 90° transfer to shipping area.

Carriers descend through degreasing tank on power-operated chain conveyor

Solenoid operated switch automatically brings trolleys on parallel tracks into single track alignment.

A well-known metal partition manufacturer faced the problem of increasing production without enlarging building. New and better handling methods were obviously needed. They chose an American MonoRail overhead handling system as the best answer to increase capacity without increasing space and with less handling labor. Now, this American MonoRail system handles the steel components from receipt of raw materials, through finishing to shipping. The system boosted production, cut handling labor, improved space utilization, reduced material damage, bettered working conditions, and improved production control.

Let an American MonoRail engineer show you how it can be done in your plant.

THE AMERICAN MONORAIL COMPANY

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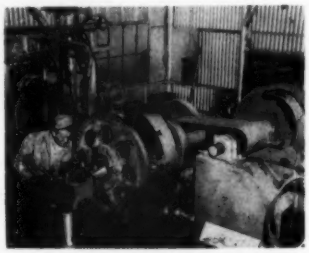
PLANT ENGINEERS' DIGEST

(Digest beings on page 26)

ing drums used on drilling rigs, the lathe had to be rebuilt. The rebuilding plans called for an increase in swing to 62 in. and a change in drive.

The machine was blocked up to obtain the necessary additional swing. A double reduction drive arrangement was installed in place of the original scheme, using step pulleys and countershaft. This change consisted of a grooved sleeve pressed on to the large diameter step of the headstock pulley. The countershaft was mounted on a cabinet which housed the variable speed drive motor and controls.

Two V-belt drives transmit power from the motor to the headstock pulley. Belt tension is obtained by jack screws between the headstock and countershaft. The result of these



Operator is watching boring job on lathe equipped with new drive. Note countershaft on motor, control cabinet

drive changes was a smooth positive flow of power enabling the shop to quickly and efficiently handle the toughest oil field jobs. *From Gates Industrial News, published by the Gates Rubber Co., Denver, Colo.*

Air Traps Do a Better Job When Separators Help

WHEN A MAN turns on a shower, he naturally expects water. Likewise, when he opens a valve at the end of an air hose, he expects compressed air. But when the outdoor temperature is warm and humid, the man may get a shower, instead of dry air. This is not good—in fact, it is very bad.

Compressed air in a line often carries water in the form of a fog or mist. When air, saturated with moisture, leaves the compressed air receiver in a warm engine room, it flows out into the plant where the temperature is lower.

This cools the air. So does the pressure drop required to get the air to flow out into the plant. The lower temperature reduces the

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really lick corrosion!

THERE'S hardly a structure or piece of equipment in your plant that won't serve you *better* and *longer* if it's protected with Pitt Chem Tar Base Coatings. No other material does such a complete job of protection at so little cost.

These tough, durable coatings will withstand years of exposure to a wide variety of atmospheric and chemical conditions, above or below ground. They're easy to apply, economical to use and provide a strong, adhesive film up to 10 times as thick as ordinary paints per coat.

Pitt Chem Coatings give you better protection because they're made by a *basic* producer and *quality-controlled* from coal to finished coatings. *If you have a corrosion problem, write or call for a Pitt Chem Coating Specialist today.* He'll be glad to make recommendations without cost or obligation.

PITT CHEM 101
A versatile, heavy duty coating that withstands severest corrosive conditions.

PITT CHEM 102
A thin, high gloss maintenance coating for steel and concrete surfaces.

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A heavy duty coating for metal exposed to corrosive vapors, dilute acids and alkalis.

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A fast drying, high gloss coating for equipment handling potable water.

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2. **Trigger Action**—one-hand operation if needed.
3. **Visi-Chek Button**—instant check for operating position.
4. **Gas Diverter**—more consistent penetration—protection to work surface.
5. **Angle-Fire Control**—to assure perpendicular penetration.
6. **Manual Safety Control**—locks tool into inoperative position.
7. **Finger-Grip Handle**—firm holding with comfort.
8. **Neoprene Grip**—fitted to the hand.
9. **Barrel Extension**—in handle for quick use.
10. **Rote-Set Safety Shield**—for easy, accurate positioning.

PLANT ENGINEERS' DIGEST

(Digest beings on page 26)

water holding capacity of the air, and the excess water forms a fog. A typical condition is shown in Fig. 1 and it doesn't take any imagination to see why the fog goes right past the drain line to the trap which has little or nothing to do.

Obviously, a separator of some kind must be installed in the air line to knock down the particles of fog and let the air go through. Fig. 2 is an example of such a separator.

Compressed air enters the inlet as indicated by the arrows. It is deflected to the bottom of the inner chamber and flows through the slotted openings into the outer chamber. Then it passes through several layers of coarse mesh screen so arranged that wires form a zig-zag passage or labyrinth of baffles on which oil and water are deposited.

The liquid thrown out of the air in its tortuous passsage through the

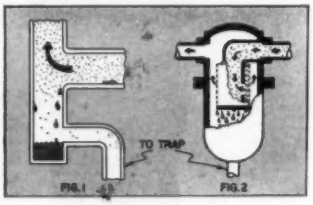


Fig. 1 shows how entrained moisture is carried by the airstream. In Fig. 2 moisture is being removed by separator

screen baffles, drops to the bottom of the separator bowl, and flows out the drain, and then to the trap. *From Armstrong Trap Magazine, published by Armstrong Machine Works, Three Rivers, Michigan.*

Ionic Purification of Water

ION EXCHANGE, rather than ordinary distillation, may soon become the predominate method for purifying water for either industrial or domestic use where fresh water is not available. This is the promise held out by a new process in which plastic semi-permeable membranes and electric power combine to remove mineral from water.

Although the method of operation of the new device has not been completely disclosed, it is believed to purify water by causing the ions, or electrically charged constituents, of the undesirable minerals present in the original water stream to migrate into a by-product stream which is later separated off.

The net result is to separate the

(Continued on page 38)

NO OTHER Power Lift Truck has ALL THESE FEATURES!

ALL CONTROLS IN HANDLE HEAD

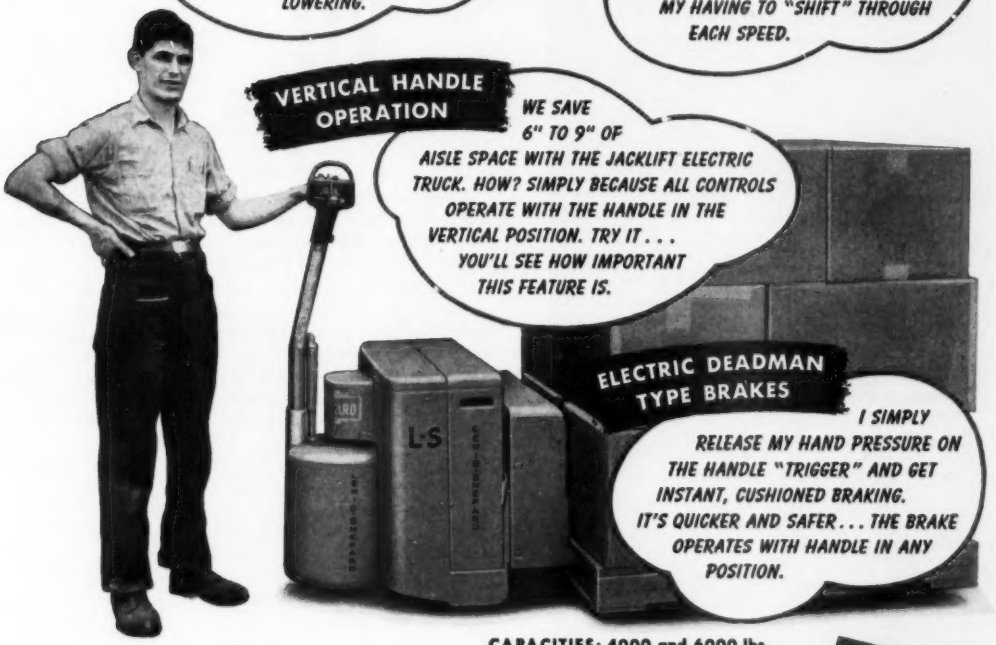
EVERY CONTROL IS IN THE PALM OF MY HAND. I HAVE MORE CONTROL — QUICKER APPLICATION — OF SPEED, DIRECTION, BRAKE, LIFTING AND LOWERING.

TIMED ACCELERATION

ALL I DO IS PRESS THE HANDLE "TRIGGER" ALL THE WAY AND SPEED PICKS UP INSTANTLY AND SMOOTHLY WITH NO JERKS OR JOLTS. THE SPECIAL TIMING DEVICE ELIMINATES MY HAVING TO "SHIFT" THROUGH EACH SPEED.

VERTICAL HANDLE OPERATION

WE SAVE 6" TO 9" OF AISLE SPACE WITH THE JACKLIFT ELECTRIC TRUCK. HOW? SIMPLY BECAUSE ALL CONTROLS OPERATE WITH THE HANDLE IN THE VERTICAL POSITION. TRY IT . . . YOU'LL SEE HOW IMPORTANT THIS FEATURE IS.



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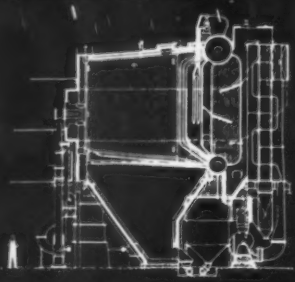
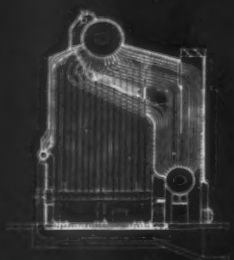
The Most Complete Line is the Master Line

VU-40 BOILER installed in a large Southern plant. This unit is fired by coal, using C-E Spreader Stokers (continuous discharge type). Capacity of this boiler is 150,000 lb of steam per hr at a pressure of 900 psi and a temperature of 808 F.



VU-50 BOILER installed in Midwestern plant. This boiler is fired with pulverized coal using C-E Raymond Bowl Mills. The capacity is 65,000 lb of steam per hr. Steam pressure is 400 psi — steam temperature is 600 F.



VU-10 BOILER fired with oil. Installed in an Eastern plant, the boiler's capacity is 15,000 lb of steam per hr at 250 psi and 480 F. VU-10 capacities range from 10,000 to 60,000 lb of steam per hr. They may also be fired by spreader, underfeed or chain grate stokers.

Industries follow the leaders to VU

In industry after industry, you'll find leading companies are setting the pace for efficient, reliable steam production with C-E Vertical-Unit Boilers.

The Chemical Industry is a typical example. For VU Boilers have been purchased by most of the major manufacturers in this industry, including such nationally-known leaders as those shown in the list below.

Furthermore, chemical manufacturers, both large and small, have *proved* their satisfaction with Vertical-Unit Boilers by buying them again and again. In 1951, for example, more than 60 per cent of the VU capacity ordered by chemical companies represented repeat order business. One leading manufacturer, in fact, has purchased twenty-seven units during the past twelve years — *eleven of them in 1951!*

You can profit from the experience of the Chemical Industry — as from any industry where steam for power or process is of major importance. If you use steam, investigate the lower steam costs you can get through the advanced design . . . sound construction . . . proved reliability of VU Boilers. They are available in capacities to fit your needs — from 10,000 to 350,000 pounds of steam per hour.

Typical List of Chemical Companies that have purchased VU Boilers for one or more plants

Air Reduction Co., Inc.
Allied Chemical & Dye Corp.
Atlas Powder Co.
Carbide & Carbon Chemical Corp.
Colgate-Palmolive-Peet Co.
Diamond Alkali Co.
E. I. du Pont de Nemours & Co., Inc.
B. F. Goodrich Chemical Co.
Hercules Powder Co.
Merck & Co., Inc.
National Distillers Chemical Co.
Pennsylvania Salt Mfg. Co.
Pittsburgh Coke & Chemical Co.
Charles Pfizer & Co.
Shell Chemical Co.
U. S. Industrial Chemicals Co.

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BULLETINS just released and of immediate plant interest

MATERIALS HANDLING

101 Mechanical Vibrating Conveyors—Twelve-pp Catalog 640 presents vibrating conveyors for large, medium and light tonnages, discussing their high capacity operation, minimum maintenance, other advantages. Fully illustrated with photos of installations and parts, explains material movement. Oil-immersed drives, generally selected for use with these conveyors, are described. The Jeffrey Mfg. Co.

102 Gravity Roller Conveyor — Comprehensive 12-pp Bulletin 100 describes and illustrates many types of gravity roller conveyors, including company's Turn-It-Over conveyor, a dual purpose unit for handling large and small packages. Others illustrated include a mobile tripod unit, special curved sections, hinged sections. Harry J. Ferguson Co.

103 Hand-Powered Crane Data—Sixteen-pp Bulletin 1007 gives construction details, capacity data and dimensions of some of manufacturer's hand-powered traveling cranes, providing application information for those shown. These include double and single I-beam overhead cranes, underhung types, a 1-ton capacity lightweight crane. Reading Crane & Hoist Corp.

104 Heavy Duty Tractor—Booklet P-906, 4 pp, describing company's Model MT Worksaver electric tractor for industrial towing, gives construction and other features of this tractor. Includes specifications. The Yale & Towne Mfg. Co.

105 Industrial Truck Reference Guide—Bulletin 200, 44 pp, covers company's line of current model tractors, trailers, fork lift trucks, platform lift trucks and load-carrying trucks. Major categories are: the trackless-train system; the fork-truck pallet system; and the lift truck-skid system. Each category is preceded by an analysis of applications and merits of the handling system. These analyses, combined with equipment illustrations and specifications, make the book a valuable reference source. Mercury Mfg. Co.

106 For the Tall Loads—How safe handling of high multi-unit loads is simplified by the use of an extension backrest, available as standard accessory for company's fork lift trucks, is shown in this illustrated data sheet. Towmotor Corp.

107 Automatic Pallet Loader—Sixteen-pp Form 748 introducing a new automatic pallet loader provides illustrations of the unit in operation to show its application in volume package production. Sequential photos show how it loads in various patterns, according to nature of cartons, and a diagram shows how it fits into the production line. There's also a typical plan for an installation. Lamson Corp.

108 Oil-Hydraulic Elevators—This 16-pp catalog presents company's OilLift elevators for freight and passenger service. These range in size from small elevators to heavy-duty units capable of lifting loaded fork trucks or motor trucks from floor to floor. Economy of oil-hydraulic powered elevators in three-, four- and five-story buildings is stressed. Booklet tells how to plan an installation. Globe Hoist Co.

CONSTRUCTION

110 Sandwich Panel Insulation — This folder discusses the use and advantages of Foamglas in sandwich panel constructions. Tells outstanding properties of Foamglas and includes illustrated examples of its use. Pittsburgh Corning Corp.

111 Power-Actuated Fasteners—Form 96 is an 8-pp specification booklet covering company's line of Tru-Set fasteners and accessories. Describes and illustrates both standard and heavy-duty fastening tools, drive pins, utility head threaded fasteners, external and internal threaded studs, also couplings, conduit clips and special fixtures. Ramset Fasteners, Inc.

TOOLS

112 Idea Book — Sixty pages of "1001 Shortcuts" for production, construction and maintenance make this hand-tool and hydraulic-tool handbook one of the most useful ever produced for the industrial field. Large photos and concise descriptions give the reader the benefit of ideas developed and successfully applied by hundreds of tool users. One of the big values attached to the "Idea Book" comes from the manner in which it stimulates the user to create his own ideas. Typical job photos suggest the general principles of the applications. The book has interest for a broad range of plant personnel including plant engineers, production and maintenance foremen, design and methods engineers, electricians, field service men, management men, and others. Blackhawk Manufacturing Company.

MECHANICAL POWER TRANSMISSION

113 Data on Liquid Drives—Descriptive information on company's liquid drives is offered in a handy file folder, ready for inclusion in your own reference file. Material includes Bulletin 6020, 8 pp. Also provides performance notes. Liquid Drive Div., G. K. Nelson Co.

114 Facts on Belt Dressings—The special advantages of this manufacturer's transmission belt preservative are stressed in illustrated Bulletin 526. Photos show how it permits belts to be operated "slack" for lower power consumption, longer belt life. Cling-Surface Co.

115 Cylinder Power in Action—This bulletin illustrates 16 cylinder powered movements and shows 31 actual application photos. Text tells how cylinder power can be utilized to speed production on all types of machines and equipment. Many of company's hydraulic and pneumatic cylinders, manually and electrically operated control valves are illustrated. Hanna Engineering Works.

116 V-Drive Engineering Data — Form P-10, 44 pp, serves as both manual and catalog for V-drives, parts and accessories in the range of fractional to 10 hp. Well illustrated, presents complete, easily-read descriptions, listings and prices on company's line of bushed type and fixed bore type cast iron and pressed steel V-pulleys, Mor-Grip V-belts, refrigeration fans and V-drive accessories. Maurey Mfg. Corp.

PAINTS AND COATINGS

117 Paints for Specialized Industries—Available to plant engineers are five 12-pp booklets on heavy duty maintenance paints for use in specific industries. Each treats the special maintenance problems of that industry and tells what products to use on the different surfaces, giving properties of the various paints recommended. Booklet 1 covers paints for the dairy industry; Booklet 2, the baking industry; Booklet 3, bottling industry; Booklet 4, canning industry; and Booklet 5, paper industry. State booklets wanted. Valdura Div., American Marietta Co.

118 Protective Coatings—This 44-pp catalog on Gilsonite base coatings describes properties, uses and tests to which they have been subjected. Related products, such as caulking compounds, primers and membraning material, are also presented. Coatings described are used mainly to prevent corrosion of industrial equipment, especially in chemically contaminated atmosphere, to waterproof buildings and act as a weather or vapor barrier. Insul-Mastic Corp. of America.

119 Triple-Purpose Paint—Form BP-3020 is a folder on Hydrocide Colorcoat, describing it as a new paint which primes, seals and finishes highly porous masonry surfaces in just one application. Tells how this oil base paint and aggregate is formulated to hide and fill in cracks on old buildings, prevent them on new buildings. Tells how to use the paint, includes color chips. L. Sonneborn Sons, Inc.

120 Water Repellent—Silicosal, a silicone type transparent water repellent is introduced in this 4-pp product manual. Describes uses and application of this development, telling how porous surfaces can be treated to become water repellent. Also discusses control and elimination of efflorescence. Surface Protection Co.

ELECTRICAL

121 Power Circuit Transformers — By means of comparative wiring diagrams, 12-pp Bulletin 501-15 demonstrates the economy and system simplicity afforded through the use of company's power circuit transformers in handling lighting and low voltage features of these dry type transformers, their use in converting old installations, isolating service. Tells how to select a transformer, gives dimensional data on both double wound transformers and single-wound auto transformers. Jefferson Electric Co.

August, 1952
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PLANT ENGINEERING

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122 **Motors for Product or Plant**—Bulletin MU-94 pictures and describes briefly several types of polyphase and single-phase motors, telling their applications. Also explains how company's many-purpose dry-type transformers help solve power distribution problems. Wagner Electric Corp.

123 **Differential-Voltage Indicator**—Engineering data on an instrument for indication of differential voltage, amperage, speed, pressure or other quantities which can be converted to voltage is provided in Bulletin GEC-852. Discusses stability, simple adjustment, other features; tells how indicator is designed, how it works and where it can be used. Also gives specifications, prices. General Electric Co.

124 **Resistors for Every Use**—Comprehensive 64-pp Catalog 15 illustrates and describes company's line of Vitrohm power-type wire-wound resistors. Lists seven stock types and a variety of made-to-order types. Resistor ratings range from 5 to 250 w, while resistance values listed are from 0.04 ohm to 1.75 megohms. Full details on terminals, mountings and enclosures are given. Valuable selection and application data are illustrated with charts and tables. Ward Leonard Electric Co.

125 **Electrical Contacts** — New 12-pp catalog, C-520, describes characteristics and uses of the company's line of electrical contacts. Various materials used for contacts and their properties are examined. Designed to aid in selection and use of contacts, the catalog features an outline showing best contacts for alarms, instruments, circuit breakers. Gibson Electric Co.

126 **Terminal Quality Control**—Twelve-pp Bulletin 3156 deals with quality control of entire solderless wire termination process. Tells how effective 5-way quality control is maintained from raw metal, through manufacture, to finished installation by proper design and manufacture of company's solderless terminals and tools. Aircraft-Marine Products, Inc.

127 **Self-Bonding Tape**—This pamphlet, complete with a sample strip of tape, cites features and advantages of the company's multi-purpose electrical insulating tape. Included are the electrical, physical and chemical properties important to tape's performance. Instructions for a quick test application of the sample strip are also given. Bishop Mfg. Corp.

The post card below needs no postage. Use it to order bulletins by listing item numbers of all those wanted. Two other cards are provided for you on page 133.

DATA ON PLASTICS FOR INDUSTRIAL JOBS

128 **Plastics in Overalls**—Titled, "15? Ways to Use Plastics for Maintenance," this 16-pp booklet shows by many photos and brief text how plastics are being used for protective shields, machine guards and safety equipment, for structural and protective glazing, for lighting equipment and maintenance parts, and for signs and identification markers. Many other uses suggested. Cadillac Plastic Co.

129 **Formica Printed Circuits**—This illustrated booklet shows company's developments in the field of printed circuits and their advantages in many types of electrical and electronic production. Stresses reductions in size and weight afforded, easier maintenance and savings on soldering costs. Shows how the Formica printed circuits use a photo-etch process on foil-clad plastic laminates to convert a working drawing to a working part. The Formica Co.

130 **Plastic Lenses**—Plaxiglas safety lenses, described as identical with glass in optical properties and lighter in weight, are described and pictured in Form 8-903. Discusses advantages of plastic lenses and jobs for which they are suited. American Optical Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

131 **Addenda Errata**—In all good publications minor revisions are needed from time to time, to cope with typographical errors, coded changes, new information. This booklet covers revisions in company's popular Catalog 311 on the design properties of pipe and is offered to plant engineers who use that catalog. It fits in pocket of the big book. Tube Turns, Inc.

132 **Hydraulic Check Valves** — Bulletin WH-1 describes hydraulic double cushioned check valves. Two detailed drawings show complete list of parts. Application, construction, sizes and pressures are covered, and there are tables of dimensions. Golden-Anderson Valve Specialty Co.

133 **Safety Relief Valve** — Bulletin 280 features safety relief valve Type F-81, designed to safeguard hot water heating boilers, storage tanks and heaters. ASME approved, valve has highest Btu discharge rate of any safety valve of comparable size, according to bulletin. Dimensions, shipping weights and prices are given. A. W. Cash Valve Mfg. Corp.

134 **Expansion Joints** — Bulletin CMX-1192, 8 pp, describes manufacturer's new Flexon line of expansion joints, in which recent design changes have produced joints capable of accommodating increased expansion with fewer corrugations. Gives specifications and installation data on free-flexing joints for low pressure applications, controlled-flexing joints for high pressure installations, also joints for handling high pressures. Flexonics Corp.

135 **Steam Trap Book**—Catalog J is the 44-pp new edition of this company's popular trap book. Includes a catalog section giving physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all classes of equipment; a maintenance section explaining trap installation, preventive maintenance, troubleshooting and repair. Armstrong Machine Works.

136 **Packless Expansion Joints**—Bulletin 35-51A offers 28 pp of up-to-date information on company's Corrufiex joints, their design and installation and advantages over other means of providing for thermal expansion in pipelines. Construction features are explained and illustrated; simplified selection data include tables for determining amount of expansion in pipelines. A chapter on installation discusses anchoring, alignment, traverse limits, use of gaskets, hydrostatic testing. American District Steam Co., Inc.

137 **Rugged Duct**—This illustrated bulletin gives specification data on Flexflyte, a light weight flexible duct primarily designed for aircraft, and able to withstand extreme temperatures, high and low pressures, and offering flame resistance and petroleum resistance. Tells how duct is constructed, how it can be expected to perform. Flexible Tubing Corp.

DEHUMIDIFYING, DRYING

138 **Efficient Dehumidifying** — Bulletin 222 is a 32-pp brand new edition of company's popular booklet showing how modern dehumidifying equipment solves moisture problems for industry. Illustrated by 70 photos and diagrams of actual installations, describes many production, handling and storage problems solved by installing manufacturer's Lectrodryers. Covers their use in storage areas, in materials handling, spot drying, air lines, finishing operations. Pittsburgh Lectrodryer Corp.

139 **Dryer Furnaces**—Illustrated Catalog 36, 4 pp, describes dryer furnaces for the coal, grain, chemical, lumber and other industries. Tells advantages of unit-suspended walls for this type of construction and explains how thin walls are deliberately made cool, minimizing heat losses. Bigelow-Liptak Corp.

140 **Why Dry Under Vacuum?**—Brand new Catalog 120, 24 pp, answers this question and describes methods and equipment of vacuum drying now available. Many typical drying problems and their solutions are presented. Methods covered include vacuum shelf drying, rotary vacuum drying, rotating vacuum drying and vacuum freeze. F. J. Stokes Machine Co.

INSTRUMENTS, CONTROLS

141 **Instrument Data Book**—New Bulletin TC-9, 43-pp 1952 edition of company's data book contains up-to-date prices, application recommendations and pertinent information on instrument sensing units and accessories. Among items listed are special thermocouples, radiation detectors. Essential data on making, checking and ordering thermocouples; wire sizes; and resistance and temperature-millivolt curves are included. Wheelco Instruments Div., Barber-Colman Co.

142 **Instrument Reference Bibliography**—Bulletin Index 100-A, 20 pp, presents industrial literature available. Consists of both numerical listing and alphabetical cross index for specification sheets, instrumentation data sheets, catalogs. Included in index are articles from company's quarterly publication. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

(Continued on page 133)

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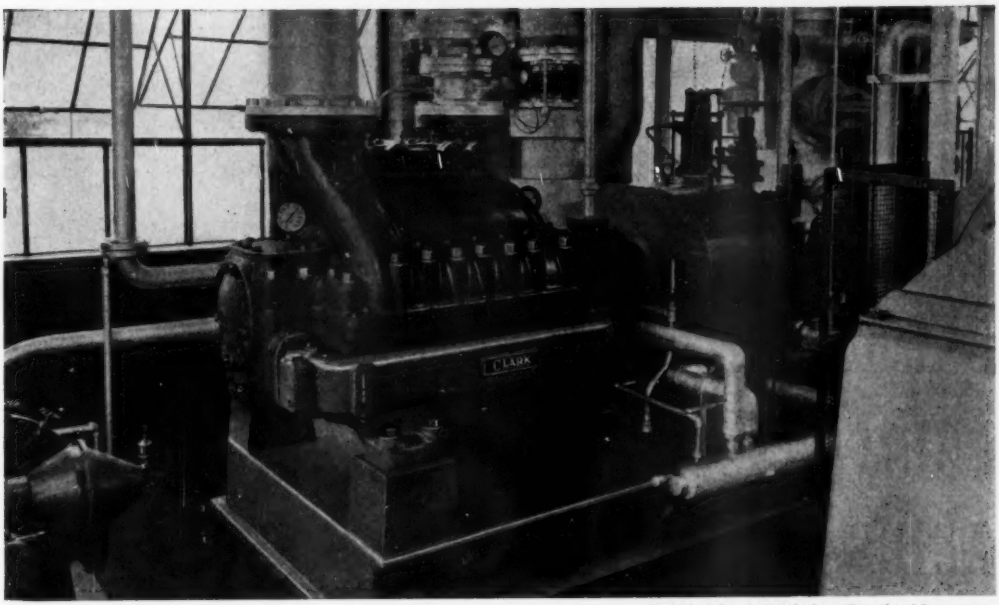
for producing life-saving Bacitracin

Commercial Solvents simplifies installation with Clark single case centrifugal compressor



Clark No. 2 Standard Multi-Stage Centrifugal Compressor, non-condensing steam turbine driven, and mounted on a steel base with the turbine for permanent alignment.

● When Commercial Solvents Corp. of Terre Haute, Indiana decided to expand facilities for the production of the new antibiotic, Bacitracin, the problem was to obtain a large supply of air that could be easily sterilized. Compressor selection would be determined by the following factors:

Air was to be oil-free.
Steam was to be the source of power.
Available floor space was 7 x 11 feet including aisles!
650 horsepower was required.

An analysis proved a centrifugal compressor would be the correct answer, economically and process-wise if the available space was sufficient. Only Clark could handle the problem because only a Clark compressor could *economically* accommodate the pressure rise in one compressor case.

The reason: Only Clark could supply water cooled interstage diaphragms between impellers, thereby reducing costs tremendously.

Clark solved this problem as it can solve your problem, the simplest way, the least costly way, the best way.

CLARK BROS. CO.
DIVISION OF DRESSER OPERATIONS, INC.
OLEAN, N. Y.
Offices in Principal Cities Throughout the World

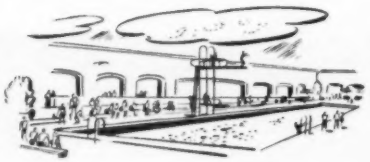
CLARK

multi-stage centrifugal COMPRESSORS

GAS-ENGINE-DRIVEN • STEAM-ENGINE-DRIVEN • MOTOR-DRIVEN • CENTRIFUGAL

FROM SERVICE STATIONS...

TO SWIMMING POOLS



CHECK CORROSION FROM ACIDS AND ALKALIES LONGER WITH

Fast-drying Parlon (Hercules chlorinated rubber) resists acids, alkalies, fumes, and salts three to four times longer than ordinary coatings. Two typical examples of the high protection Parlon gives to surfaces may be found in service stations and swimming pools.

In garages and gas stations, Parlon rubber-base paint on walls and floors resists the deteriorating action of grease, gasoline and other car servicing products. Where car washing is done, Parlon is ideal for protecting concrete, wood, and metal surfaces from alkaline cleaning chemicals and moisture.

Parlon has proved itself a favorite with swimming pool operators for many years because of its long underwater life. It is particularly durable on concrete pools, since it is unaffected by the free alkali in cement. Ask your paint supplier about easy-to-apply and economical-to-use rubber-base paint—or write direct for details.

Cellulose Products Department
HERCULES POWDER COMPANY
INCORPORATED
966 Market St., Wilmington 99, Del.

RUBBER-BASE (PARLON)® PAINTS

CR52-4

PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

flow into about two thirds fresh water and one third by-product containing a greater concentration of minerals than the original water.

One obvious application of such a device is the purification of sea water or other brackish water to make it drinkable. The process has already been proved on sea water, which contains about 3.5 per cent salts. The by-product brine may be discarded, or eventually processes may be worked out for recovering commercially desirable mineral salts, such as those containing potassium, magnesium, or bromine, for which sea water is the customary source at present.

The device does not, however, remove bacteria or organic matter, and a modification of the system would be necessary for drinking water or other uses with this problem.

Adoption of the new device for a number of industrial purposes appears promising; where the end product has a high profit margin, a relatively high treatment cost is justified. The purification of sugar, glycerine, and milk and the recovery of valuable chemicals and materials from waste streams have already been suggested.

In addition, the obvious parallel is drawn with the semi-permeable membranes which exist in the human body; the properties common to Ionics' membranes and those which occur naturally suggest important applications in basic biological and medical research. *From Industrial Bulletin, published by Arthur D. Little, Incorporated, Cambridge, Massachusetts.*

Bin-Level Indicators Show Versatility in Use

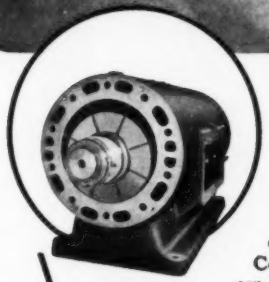
In the flow diagram, indicators are being used to signal the level of material in the silo and to control the level in the supply bin. But note that the device can be used for more than bin-level control. Three of them, B, C, and D, are used on the conveyor to control rate of feed, to stop the system in case of choking, and signal lack of feed.

Such an installation provides steady flow of material and in addition reduces the cost of downtime, repairs and spoiled material. For example, in one fairly simple installation, two indicators have effected a direct cost saving of some $550 per year.

The system in this case consists of 3 enclosed flight conveyors in series carrying fluorspar from rail-

FULLER ROTARY AIR COMPRESSORS

WORK FOR WESTERN ELECTRIC



Long periods of continuous operation don't overtax these Fuller Compressors at Western Electric Co. plant at Indianapolis, Ind., where two 3300 cfm. two-stage duplex units and one 1665 cfm two-stage single unit supply all plant needs at 100 psig.

Endurance, plus efficiency, are results of the rotary principle employed in these compressors. Elimination of reciprocating parts does away with flow pulsations, cuts down on vibration and need for continual take-up of bearings. Another feature of interest to cost-conscious engineers is the limited maintenance required by Fuller Rotary Compressors—rotor, blades, and bearings are the only moving parts.

Because these compressors do not require valves, top overall efficiency is maintained at all times—no capacity is lost around leaking valves, no time lost to grind seats. Fuller Compressors do not require driving mechanisms nor speed change gears—they are designed to operate at common electric motor and internal combustion engine speeds.

You'll find these compressors stay on the job, operate with sustained high efficiency and require little maintenance. If your plant requires air in volume, it will pay you to investigate the advantages of Fuller Rotary Compressors. A Fuller engineer will discuss them with you.

Fuller

FULLER COMPANY, Catasauqua, Pa.
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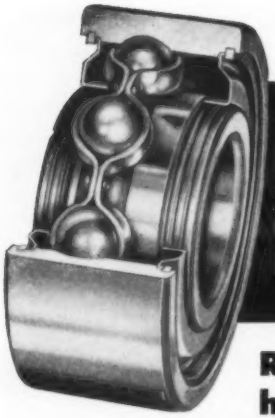
DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—
COMPRESSORS AND VACUUM PUMPS—
FEEDERS AND ASSOCIATED EQUIPMENT

C-214



BIG-BEARING STAMINA

R & M MOTORS have what it takes for SERVICE without SERVICING

This is the exact size of bearing used on a 2-h.p., frame 224. Such higher load rating helps to preserve the effective, efficient sealing so that grease stays in—dirt stays out—for maintenance-free operation.

•

You don't have to take motors apart to compare the bearing sizes. Just look at the hubs—the bigger they are, the larger are the bearings. We invite you to make this simple check wherever you see motors. You'll find R & M far ahead of the field in size as well as service.

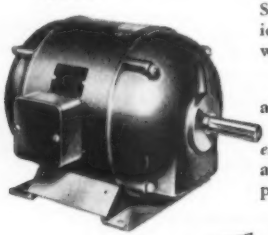
Another R & M plus you're sure to appreciate is protection from rust and corrosion. Moisture is kept away from these bearings by the presence of water-repellent.

When Robbins & Myers *pioneered* pre-lubricated, fully sealed ball bearings in standard motors—back in 1939—this type of bearing was new. Today, there are many applications. And users have found a *new freedom from servicing* because re-greasing isn't needed for years.

THAT'S A BIG ADVANTAGE, of course, but these bearings wouldn't be used in R & M motors if they weren't also *best* for the service. The very fact that greasing is so seldom required helps to *improve* their performance.

DIRTY FITTINGS, grease, and grease guns *can't* contaminate the lubricant. Over-greasing is impossible. Grease can't get out to leave bearings unprotected, deteriorate insulation, or cause overheating. And the *wrong grease* will never be used.

NOR CAN OUTSIDE DUST and dirt work in. So—for five years, at least, of normal service—these bearings deliver *utmost efficiency* with no attention whatever.



Robbins & Myers has used this same type and size of bearing from the first, because it's biggest—best protected—*longest lasting.* Here's big-bearing stamina in a class by itself, yet you pay not a penny premium.

All-Purpose... All-Weather

These better, cooler-running motors have full-height shrouded end-heads, gasketed terminal boxes, insulated coil-ends, and exclusive R & M "Weatherizing" to shield every part from moisture. Ask for Bulletin P-400-E.

R&M means Reliable Motors

ROBBINS & MYERS • INC.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

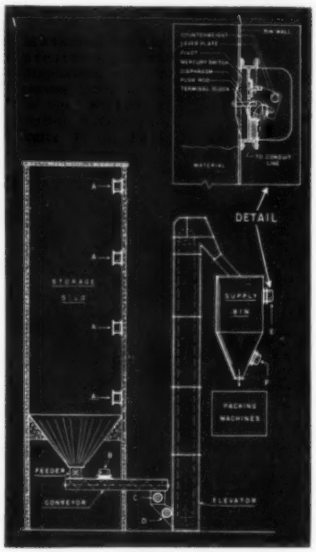
MOTORS • HOISTS • CRANES • FANS • MOYNO PUMPS

PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

road track hoppers to the top of a storage silo. One indicator was installed in a chute between the first and second conveyor and the other between the second and third.

Formerly, if one conveyor broke down or jammed, preceding conveyors continued to feed until they chocked and broke the shear pins. Now, if one conveyor jams, preceding conveyors are stopped automatically by the indicators.



Letters indicate typical indicator applications. B.C.D. sense flow and stoppage

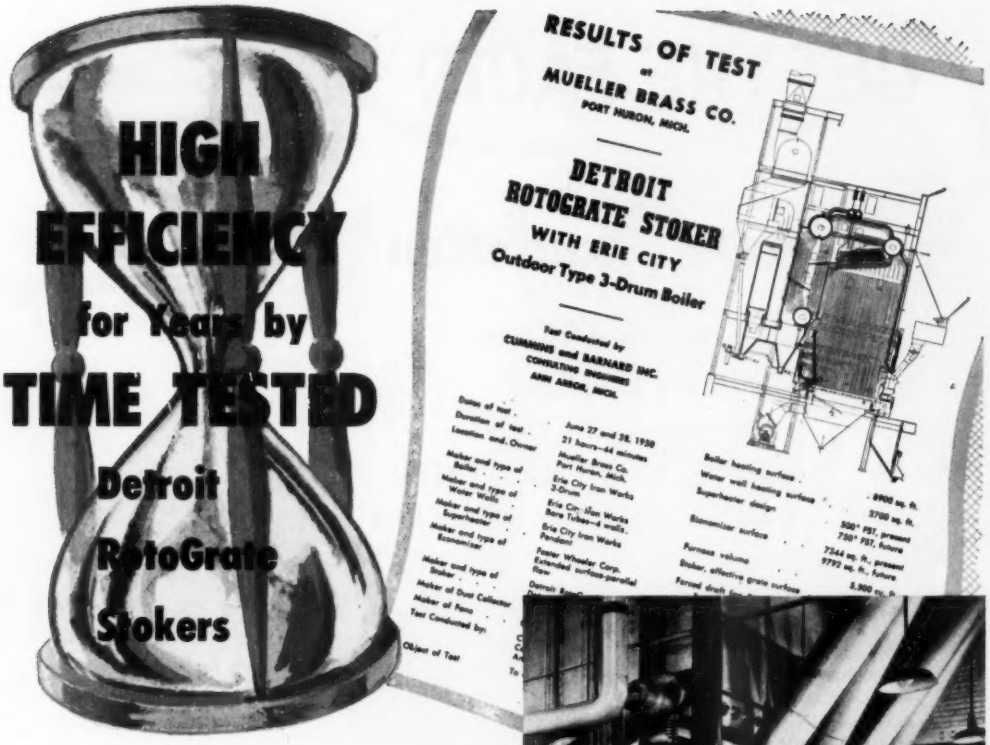
No longer does trouble on one conveyor result in the whole system's having to be opened up, cleaned and repaired. *From Neoprene Notebook, published by the Rubber Chemicals Div. of E. I. du Pont de Nemours & Co., (Inc.), Wilmington, Delaware.*

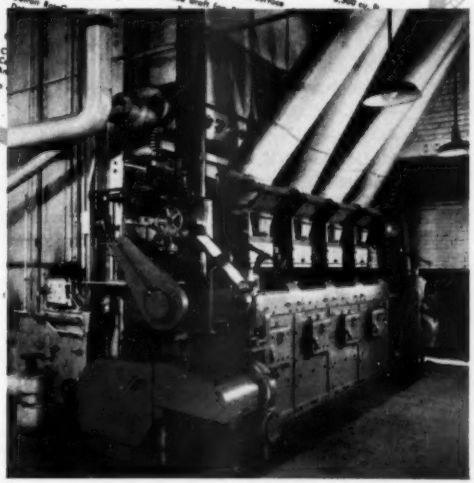
Rotary Air Compressor Rolls In to Speed Up Gunite Work

SPEED IN Gunite construction work has been increased approximately 25 per cent through the development of a 600 cfm rotary air compressor.

This type of machine was put to use by a Detroit contracting firm in the summer of 1951. Since that time, company records have consistently reflected a substantial production increase.

One of the officers of this company





Detroit RotoGrate Stoker applied to the 110,000 pound unit at Mueller Brass Co., Port Huron, Mich.

Results of tests of the Mueller Brass new steam generating unit by the consultants were most gratifying. They are typical of Detroit RotoGrate Stoker performance.

Especially important to you as a buyer is the *test of time*. Performance records of the RotoGrates in hundreds of plants—show high overall thermal efficiency, high availability and extremely low maintenance with all grades of coal.

Write for Detroit RotoGrate Bulletin

There is a Type and Size Detroit Stoker for Every Industrial Need

Detroit Stoker Company

GET THE FACTS

on AUTOMATIC

Voltage Regulation

Learn how YOU can:

- INCREASE EFFICIENCY
- MINIMIZE DOWN TIME
- REDUCE MAINTENANCE COSTS
- MAINTAIN QUALITY PRODUCTION

of ELECTRICALLY-OPERATED EQUIPMENT

HERE IS IMPORTANT INFORMATION FOR THE FACTORY OWNER AND MANAGER, CHIEF ENGINEER, METHODS ENGINEER, PLANT ENGINEER, MAINTENANCE SUPERINTENDENT, PRODUCTION CONTROL MANAGER AND ELECTRICIAN

Bulletin S351 contains complete information on STABILINE Automatic Voltage Regulators. Included are ratings, circuit diagrams and illustrations on the numerous standard models available to maintain a constant output voltage regardless of line or load changes. This bulletin is yours for the asking — just fill in and mail the attached coupon.

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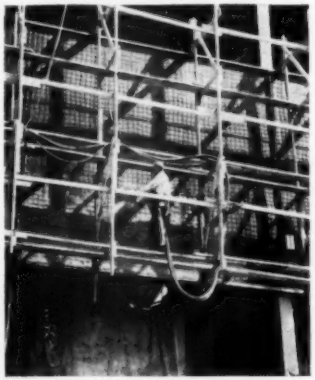
BRISTOL, CONNECTICUT

POWERSTAT LIGHT DIMMING EQUIPMENT • STABILINE AUTOMATIC VOLTAGE REGULATORS • 5-WAY BINDING POSTS
VOLTBOX A-C POWER SUPPLIES • POWERSTAT VARIABLE TRANSFORMERS • VARICELL D-C POWER SUPPLIES

PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

reported that the compressed air motor which drives the mechanism of each cement gun requires air at an approximate rate of 60 cfm. Based on the machine's full output, a balance of 480 cfm is shared by



Gunite is being applied to build up a 2 in. reinforced wall. Dry material supplied via hose is hydrated at nozzle

each of the two guns in the conveyance of a mixture of dry sand and cement through hoses to the point of application.

Progress on a recent job which involved over 67,000 sq ft of 2 in. wall on a high industrial building was consistently maintained at the rate of 100 sq ft per gun per hr.

The availability of smaller high-speed two-cycle Diesels was an important factor in the development of this new unit. Its use helped the designers produce a compressor of higher capacity and at the same time reduce its size and weight. *From a release for Detroit Diesel Engine Div., General Motors Corp., Detroit, Michigan.*

Overhauling Zeolite Softeners

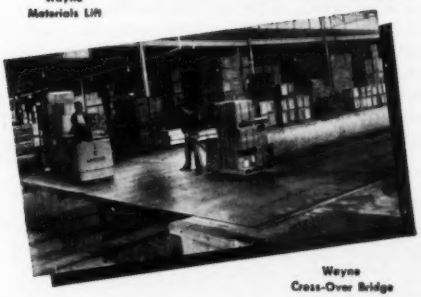
NORMALLY ZEOLITE softeners operate for years without attention, but if, at long last, it becomes necessary to overhaul the equipment, a little time in planning the job beforehand will be well spent.

Since such work will be performed to bring the softener back to original condition as nearly as possible, it is desirable to have a sample of this zeolite checked for exchange capacity before setting the actual date so that new material can be obtained if required.

It is possible that some mixing of the various sizes of gravel may have

CUT HANDLING COSTS...SPEED LOADING

Wayne
Materials Lift



Wayne
Cross-Over Bridge

TILT TO MEET LOAD...CUT LOADING TIME IN HALF

Unloading raw materials . . . loading finished products just back up truck and loading dock lift is adjusted to correct height . . . industrial trucks to roll on and off easily. No chain lifts, pry bars or costly manual labor necessary. Wayne Dock Lifts do it all . . . with valve or push button control of quick acting hydraulic system. Adjusts to any height.

From loading docks to production line, there's a Wayne Industrial Lift to save time, labor and money. Wayne Lifts include ramps, sidewalk elevators, material lifts, cross over bridges, service lifts and others. Every one custom engineered to the needs of your plant. Designed and built to help you safely move materials faster and at lower costs. Write for Wayne Industrial Lift booklet.

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BUS DUCT IS FLEXIBLE

"It's So Flexible To Plant Layout..." says The Randall Company

The Randall Company officials stated, "It's so flexible to plant layout and production line shifts that it's just what we need for future changes and expansion."

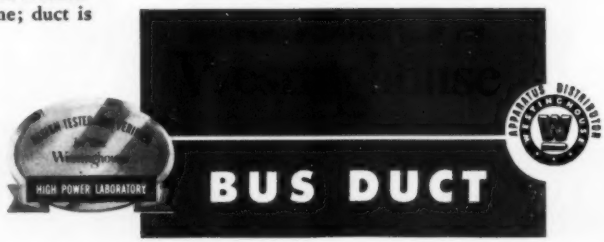
"The ease of installing your Bus Duct was amazing . . . it saved us both time and money," said the contractor, Mr. Edward P. Fogarty, President of Fogarty Electric Company, Cincinnati, about this job.

This large installation of Westinghouse Low Impedance and Plug-In Bus Duct is in the Randall Company plant at Wilmington, Ohio. It is assembled from standardized sections that allow rapid dismantling and reassembly without waste of time; duct is fully salvageable.

Up to 5,000 amperes, Westinghouse Bus Duct provides more power per pound of equipment than any system of wireway, cable or conduit. Four types are available to handle all load requirements, meet all service conditions in your plant or building from power source to outlet.

Get complete facts by calling your Westinghouse Distributor or write for B-4272-A, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-30108



(Digest begins on page 26)

taken place. Therefore, a set of screens for regrading the gravel should be available. With care, however, this regrading operation can be avoided unless it is suspected that the bed may have been upset at some time. In some instances it may be cheaper to buy new graded gravel rather than bother with construction of screens.

Assuming that all is in readiness to start the job, the tank is drained dry with the top vent open. The manhole cover is removed and laid aside. The zeolite is then unloaded from the tank in any convenient way, the usual method being by bucket. If the zeolite is to be reused, store it temporarily in some protected place where it will not be mistaken for a junkpile. Next, the gravel is removed, layer by layer, keeping the various sizes separate.

With the tank empty the inside should be hosed down to knock any loose rust off the sides. If corrosion pits are present and they are not too extensive, they can be repaired by filling with weld metal and grinding smooth. All internal piping should be replaced if necessary.

In refilling, the coarse gravel is placed in the bottom of an even layer. Then progressively smaller sizes of gravel follow in layers. In placing the zeolite, the procedure is the same.

To fill the tank with water, set the valve or valves in the backwash position and throttle the inflow to fill the tank slowly. Vent the top of the tank. Use caution because the bed can be upset easily at this time.

When the tank is filled, backwash at the normal rate until all the fines have been removed, and then proceed with the usual regeneration. When the rinse after regeneration checks satisfactorily by the soap test, return the softener to service. *From Engineering, published by Cochrane Engineering Corp., Chicago, Illinois.*

Things Go Haywire Receiver Blows Up

AN AMMONIA refrigerating system at a cold storage warehouse was running normally when it was checked prior to locking the plant for the night. Design of this 150 hp system was such that it could take care of itself without a night operator. In addition to the usual operating controls, it was well-supplied with safety devices.

The system was also protected against failure of the condenser-water pump. The motor driving this

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1001 shortcuts to save you time... money... materials with hydraulic tools and hand tools

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Do you make any of these products?

DUST COLLECTION IS CUTTING THEIR PRODUCTION COST

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Aero-Marine Engines	Fertilizer
Diesel Locomotives	Food from Soya Beans
Marine Diesels	Alfalfa
Spark Plugs	Grain Foods
Carbon Black (tires)	Baked Foods
Rubber (3)	Agricultural Insecticides (3)
Synthetic Cork & Rubber	Dairy Cleansers
Alloy for Steel	Cement
Strip Mill (sheets)	Building Board (2)
Metal Castings (5)	Building Granite (2)
Petroleum Refining (2)	Asphalt Products
Oil Well Reactivators	Thermal Insulation (4)
Carborundum	Sulpha Drugs
Pyrometer Tubes	Pharmaceuticals (5)
Mica Insulation	Textiles
Optical Goods	Paints
Motor Controls.	Printing Ink
Jewel Bearings	Printing
Lead Oxides (3)	Electric Ranges
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Detergents	Clay Products (2)

The above list is *end products* as shown by a canvass of users of 71 consecutive Sly Dust Filter installations, made recently—*not* a handpicked list, just taken in sequence.

Bulletin 98—one of the most helpful booklets on dust collection ever written. Free on request.

Whatever you make, the probabilities are that dust collection can reduce your operating costs. Because of our fifty years' experience, and the advantages of Sly equipment in thorough dust collection and economies of operation, we believe we can save you money.

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PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

pump was interlocked electrically with the compressor motors so that the compressors would be shut down automatically if the pump motor stopped for any reason.

In spite of this arrangement of safety valves and automatic controls, ½ hr after the owner left the plant the pressure got out of control and one of the receivers blew up, as a result.

An investigation disclosed an unusual combination of accident-producing conditions in existence. There was an unexpected defect in the shaft of the condenser-water pump, and seam defects in the receiver that exploded. The interlock on the pump motor did not provide the protection expected of it and the high pressure switch was faulty.

The condenser-water pump shaft broke and the pump stopped. But its driving motor continued to run, so the interlock was not called into play. With the compressors running, the pressure on the discharge side started to rise because there was no condenser cooling water.

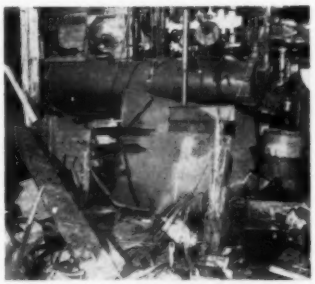
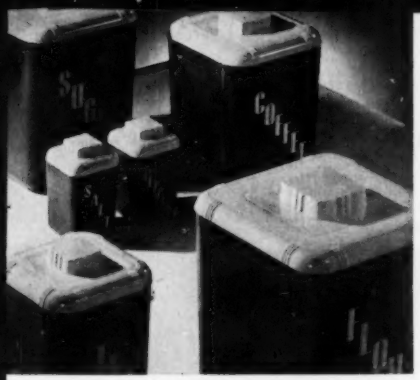


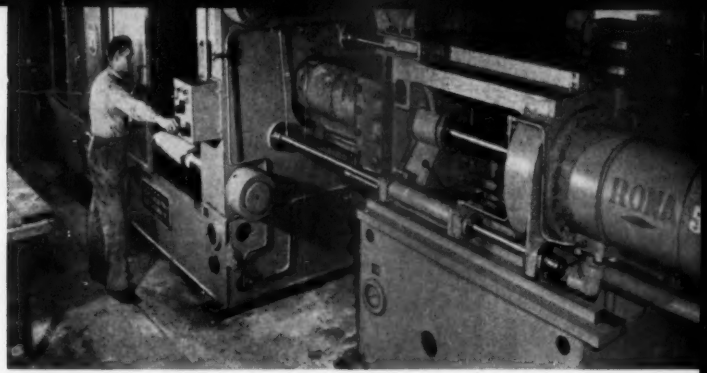
Plate standing near condenser is a part of the destroyed ammonia receiver

When the pressure reached the cut-off switch trip point, there was no reaction as an adjustment screw dropped out of its mechanical linkage. So, the pressure kept increasing until one of the receivers exploded.

The vessel was supposed to have been strong enough to withstand pressures considerably higher than the 275 psig settings of the safety valves. But it was found that its welded seams had been weakened by defects located at inaccessible points on the inside. This probably lowered the strength of the receiver sufficiently to permit an explosion at some pressure less than the 275 psig relief pressure. *From the Locomotive, published by the Hartford Steam Boiler Inspection and Insurance Co., Hartford, Conn.*



NO MORE PROBLEMS. The production of plastic household items by Rona Plastic Corporation was slowed down by an inadequate hydraulic oil. A switch to Sunvis 999, over a year ago, restored it to normal.



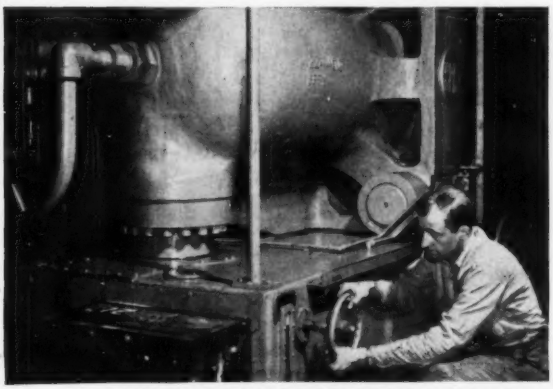
PRESSURE LOSSES ENDED. There are few plastic molding machines as big as this 60 ounce model. It exerts a pressure of 1,000 tons. Because the hydraulic oil formerly used sludged up and thinned out, it could not maintain this pressure. But Sunvis 999 has fully met these severe requirements, as well as those of Rona's nine other hydraulic machines of varying sizes.

PLASTIC MOLDER'S BOTTLENECK ENDED BY SUNVIS HYDRAULIC OIL

More than a year ago Rona Plastic Corporation, New York City, had trouble with its hydraulic molding machines. The machines functioned erratically due to oil sludge sticking the control mechanisms. In addition, the oil thinned out excessively at normal operating temperatures, and resulted in the loss of proper clamping pressures on the dies. To keep the machines going at all, it was necessary to drain, clean, and entirely recharge the systems at frequent intervals.

A Sun representative, called in by Rona, studied the problem and recommended Sunvis 999. He knew it would put an end to pressure losses, because, even at elevated temperatures, it does not decrease in viscosity as much as most other oils. He also knew its exceptional stability would end the sludging problem.

Sunvis 999 proved to be the answer to all Rona's hydraulic oil problems. The original charges, with minimum make-up, are still giving good service. Rona can expect the same performance for a long time to come, because experience shows that under normal operating conditions, Sunvis 900 Series Oils are *good for the life of the equipment.*



NO OIL CHANGES HAVE BEEN NEEDED. Before Sunvis 999 was adopted, the oil in each of the machines had to be changed frequently (the one pictured holds 450 gallons). The original charges of Sunvis 999 have been in use now for more than a year.

Department PY-8
Sun Oil Company, Philadelphia 3, Pa.

I am interested in knowing more about Sun Hydraulic Oils. ☐ I would like to consult with a Sun representative. ☐ Send the booklet "Hydraulic Fundamentals and Industrial Hydraulic Oils."

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Edited by H. E. B. Anderson

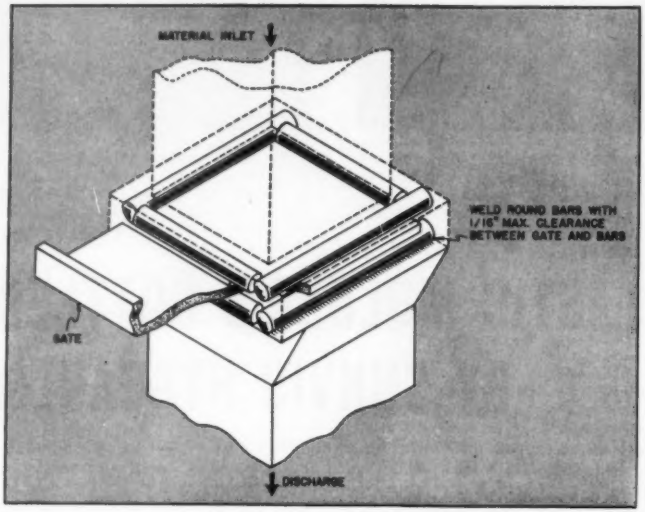
Improved Slide Valve — Third Prize Winner in the August PLANgineering Contest

Submitted by R. V. Rogers, Asst. Plant Manager, Morton Salt Co., Port Huron, Mich.

IN THE HANDLING of dry materials, such as salt, soda ash, corn or wheat from bins and hoppers, a suitable slide gate for controlling flow is a valuable asset.

An improved valve was designed to meet the following specifications: first, it should be simple in construction and adaptable for easy installation in any shape opening; second, the cost should not be greater than the cost of any currently used slide gate; third, the friction load of the gate movement should be considerably less than the valves in use; and fourth, it must give a tight closure, and have a minimum amount of leakage with the slide in any position.

The use of round rods as the bearing surface of the gate as it slides in the valve reduces the friction load. Tight closure is assured, since there is no recess in the back of the housing to fill up and thus prevent complete closure of the gate. The valve is self-cleaning. It can be a cast, welded or bolted unit.



Stainless Steel Drip Nipples — Fourth Prize Winner in the August PLANgineering Contest

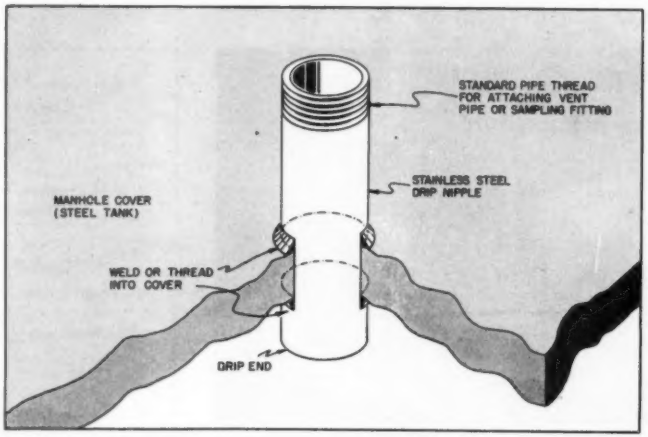
Submitted by Chester Smith, Works Engineer, Atlas Powder Co., Houghton, Mich.

MIXED ACID containing approximately 50% concentrated nitric and 50% concentrated sulphuric may be stored in steel tanks without much corrosion to the steel with which it comes in contact. However, practically every acid storage tank is equipped with openings for vent pipes and for sampling acid. These openings are usually located in the steel cover of a manhole or nozzle on top of the tank.

Sulphuric acid fumes are hygroscopic and absorb moisture from the air. This moisture forms a weak acid which attacks steel. In the case of vent and sample openings, the weak acid accumulates under the steel covers around the openings and causes excessive corrosion at these points. This corrosion eventually spreads out to attack the entire surface of the cover inside the tank, forming a crater with the greatest corrosion at the openings. Very often the crater causes the weak acid to run down the inside walls of the manhole or nozzle, eating entirely through before the condition is noticed. When this happens the manhole or nozzle usually must be replaced.

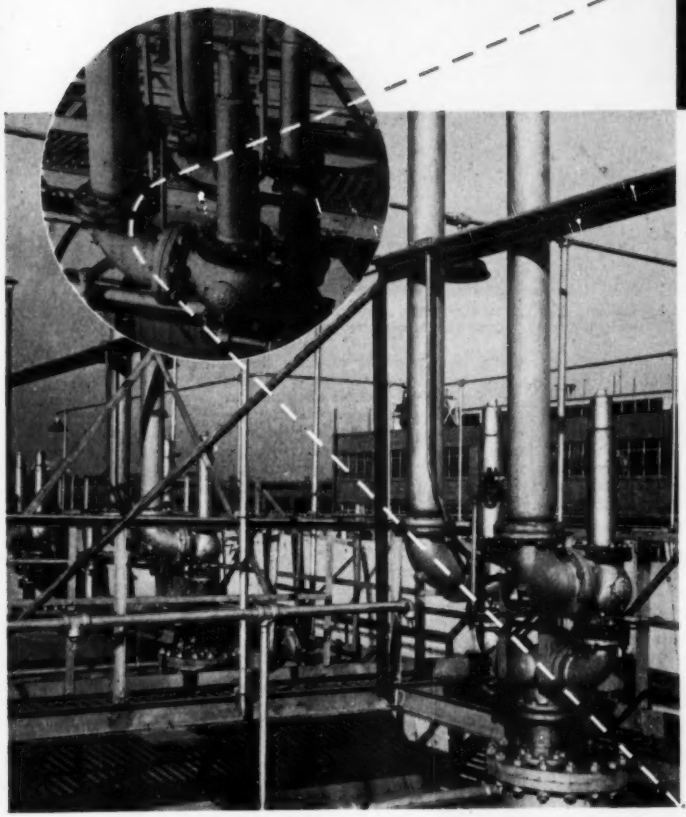
Stainless steel (18-8) is resistant to nitric acid of practically any strength; and it is equally resistant to attack by concentrated mixed acid. Therefore, by installing 18-8 stainless steel drip nipples of suitable size in all vent and sample openings in covers so that they project about 1½ in. below the inside surface of the covers, it is possible to prevent the dripping weak acid from attacking the steel covers and the inside walls of manholes and nozzles.

The drip nipple idea may be extended in the chemical industry to include other solutions.


STANDARD PIPE THREAD FOR ATTACHING VENT PIPE OR SAMPLING FITTING
STAINLESS STEEL DRIP NIPPLE
MANHOLE COVER (STEEL TANK)
WELD OR THREAD INTO COVER
DRIP END

Have your cake and eat it too!
...or how GOODYEAR gets the benefits of the

BS&B Safety Head



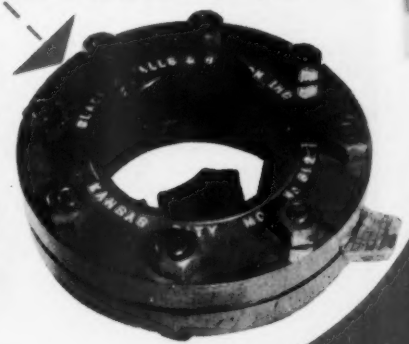
"fail-safe" action... WITHOUT LOSS OF VALUABLE BUTADIENE

Safety and savings go in pairs at the Goodyear Tire and Rubber Company's Chemigum Plant at Akron, Ohio...made possible by use of BS&B Combination SAFETY HEAD – Relief Valve Models CL-31. When the designed rupture pressure of the 125 lbs. Monel or stainless rupture disc is reached it will "fail-safe", thus relieving the pressure and preventing damage to expensive equipment, and most important of all...personnel injury.

However, working with BS&B engineers and adapting standard equipment, Goodyear has carried safety a step further to include savings. Each of the 15,000 gallon butadiene storage tanks, operating at maximum average pressures of 75 psig. is equipped with a manually operated 3-way valve and two CL-31s. This dual SAFETY-HEAD-Relief Valve arrangement prevents the excessive and expensive loss of valuable butadiene in the event of a ruptured disc. Quick, easy switch-over to the second combination unit is possible giving full safety protection again – even while the replacement of a burst disc in the first combination unit is going on.

Built-in SAFETY for chemical processing

BS&B SAFETY HEADS assure instant pressure relief when needed most. They can be used as both primary and secondary relief devices... designed to rupture within plus or minus 5% of the pre-determined pressure. Discs are available within a range of 5 lbs. to 40,000 lbs. Regardless of your pressure application – air, gas or liquid – bland or corrosive, BS&B has the code-accepted SAFETY HEAD FOR YOU. Write for catalog giving complete details. Get the facts and you'll want the built-in safety BS&B SAFETY HEADS provide.



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7500 East 12th Street Dept. 2-P8 Kansas City 3, Missouri

MAINTENANCE & OPERATION

(M and O begins on page 48)

Electrician's Truck Takes Parts and Tools to the Job

Contributed by R. E. Petterson, Birtman Electric Company

IN A PLANT covering 100,000 sq ft, electricians doing both maintenance and construction work in all plant departments found themselves involved in a problem of logistics. In spite of the central location of the electrical department, any parts, wire, or ladders needed on a job required a trip back to the shop where they were stored. Also, the conduit bender, bench vise and pipe cutter were in the central location.

To save time by eliminating these trips, a utility truck was devised. Mounted on four large casters, two of which swivel for turning, the truck carries a supply of the most commonly used items of wire and conduit fittings, thus making them available at the job site.

The addition of a machinist's vise and a pipefitter's vise makes the truck a portable workshop, as well as a storeroom.

The items stocked on the truck are quite varied, and can be changed readily, to suit the work being done. Among these items are: wire, conduit, small tools, junction boxes, concrete anchors, condulets, covers, straps, nipples, couplings, connectors, lock nuts and a wire fish tape. A combination ladder is slung on one side of the truck.

Although necessarily limited in capacity, planned stocking of the truck can provide an ample supply of those items most likely to be needed on a job.

Designed by the men who use it, this truck transports tools, fittings and conduit to the job site. Vises mounted as shown convert truck top into a work bench

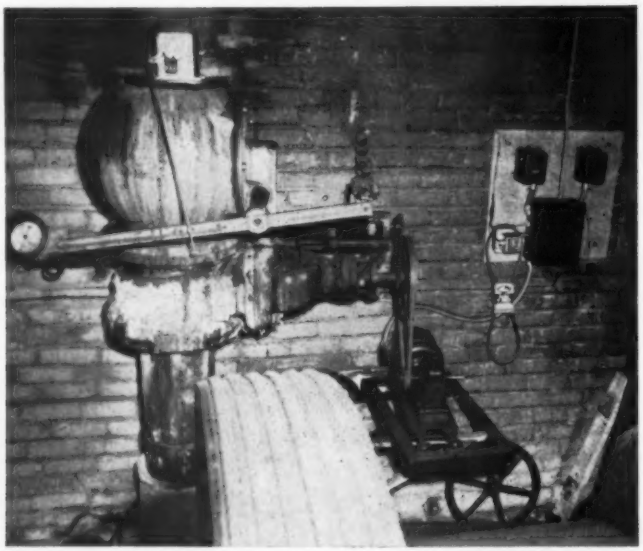
Remote Control Added, Steps Subtracted in Building Heating System

Contributed by L. J. Carpenter

IN A HOTEL power plant generating electricity for power and lights, with the exhaust steam used for heating, the back pressure butterfly valve was controlled by a weighted lever. If the weather was mild, the weight was set for about 2 psi; if cold, it was set to carry 4 psi. In extremely cold weather, a gate valve in the line just ahead of the butterfly valve had to be closed to prevent leakage through the butterfly to the atmosphere. Each time a change was made to either valve, sometimes several times a day, it meant a trip to the roof, where the valves were located.

To eliminate these trips the engineer mounted a Honeywell Modutrol motor on the butterfly valve, connecting the arm of the motor to the lever of the valve. A pressuretrol was connected to the low pressure steam line in the boiler room and wired to the motor on the roof. By setting the control to the desired pressure, the motor at the valve was controlled to operate the valve as needed to maintain that pressure in the heating system steam line.

To solve the problem of opening or closing the gate valve from the basement, a base was built to mount a 3 phase motor, coupled to a speed reducer. By replacing the valve hand wheel with a grooved sheave and connecting the speed reducer to this sheave with a V belt, a means of remotely operating the valve was achieved. Two 2-pole relays mounted near the motor were connected to a single pole, double throw switch in the boiler room. The motor was wired through the relays



Valve controls at exhaust point of heating system. Butterfly valve lever is operated through a linkage to the Modutrol motor; gate valve is opened and closed by remotely-controlled motor, through speed reducer and V-belt drive

Each Panelboard on this page is designed for ONE kind of job...

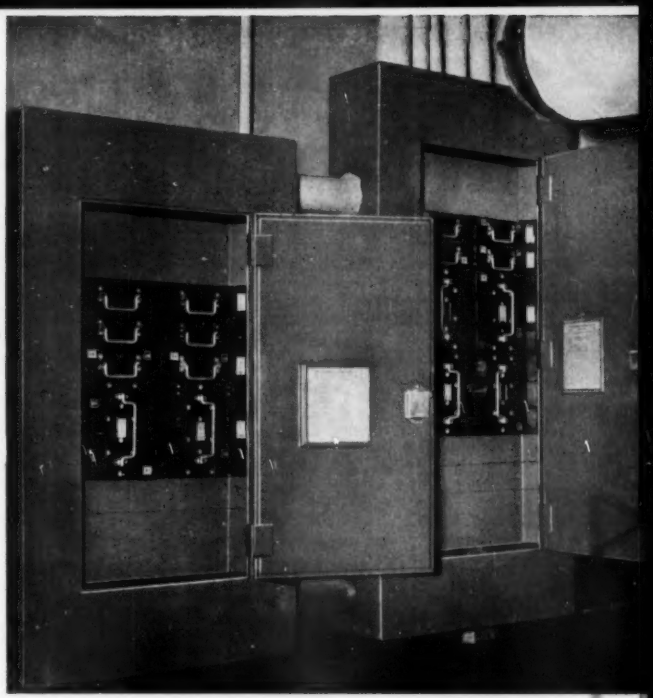
... the job that a "particular" kind of distribution circuit in your plant calls for.

Of course, we both know that your distribution circuits are much the same as those in other plants, but, when you come right down to it, you won't find very many electrical distribution circuits that are *exactly* the same.

To make sure you get the best panel for each application, Trumbull does two things:

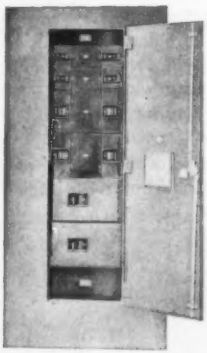
1. Supplies enough *different* types of panelboards to cover every kind of service requirement.
2. Exactly matches the special combination of requirements you set up for each panel through *standardized* construction that permits fast but *individualized* assembly of components.

"Specially assembled" panels of the types shown on this page will exactly meet any distribution panelboard requirement you now have. Others will take care of all your lighter power and lighting requirements.

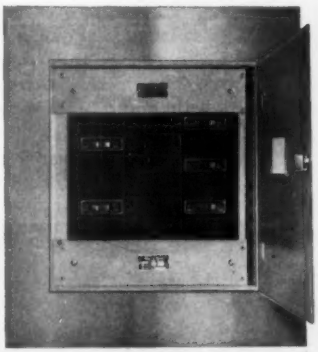


1. Two Trumbull Converti-Fuse Panelboards—the most compact distribution panelboards available. Branches: 30 to 400 amps. Service: 250 volts d-c, 600 volts a-c; single- or three-phase. Interchangeable sections and fuse clips.

2. A Trumbull Swing-Wa Panelboard—an ultra sturdy heavy-duty fusible panelboard with dead-front, hinged cover operation. Branches: 30 to 600 amps. Service: 250 volts d-c, 600 volts a-c; single- or three-phase. Circuits are convertible.



3. A Trumbull Convertible Circuit-Breaker Panelboard—versatile circuit-breaker-type assembly, *sectionalized* for maximum convertibility. Can include space for future circuits. Branches: 15-600 amps. Service: 250 volts d-c, 600 volts a-c.



4. A Trumbull ABH Circuit-Breaker Panelboard—uses same type circuit breakers as the "convertible" panel. Compactly designed to handle lighter loads. Branches: 15 to 50 amps. Service: 240 volts a-c single- or three-phase; 125/250 volts d-c.

Write for bulletin or check soon with your local Trumbull distributor.

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American Chain

MAINTENANCE & OPERATION

(M and O begins on page 48)

so as to selectively run the motor with right or left hand rotation, to open or close the valve. The use of 24v coils in the relays permitted running thermostat wire from the roof to boiler room, without conduit.

The valve motor was stopped by a limit switch actuated by a screw connected to the valve stem through a chain drive. Thus, a predetermined number of turns of the valve stem in either direction would trip the switch, breaking the circuit and stopping the motor.

To maintain belt tension, which was affected by the riser movement during expansion and contraction, it was necessary to mount the motor drive base on the riser itself, to float the complete assembly.

Belt Shifter-Idler Combination

Contributed by Myron Bixler

A GROUP of buffing machines, belt driven from an overhead line shaft, were turning out poor quality work. Belt slippage, occuring when the work pieces were pressed against the sandpaper-covered drums, caused the drums to slow down excessively, with resultant poor buffing action.

It was known that idlers installed on the upper side of the belt would increase the arc of contact on the bottom driven pulleys, thus decreasing the slippage. However, the machines were stopped and started by

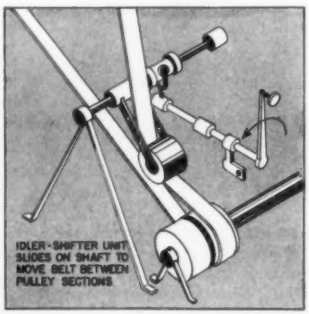

Diagram of shifter-idler combination illustrates action of yoke to shift belt

shifting the drive belts between tight and loose pulleys on the driven shafts. Therefore, to permit continued use of the sliding belt shifter to operate the machines, a special idler was required.

In the arrangement used, an idler pulley is mounted to allow lateral movement when the drive belt is

shifted, and angular movement as the pulley assembly rides on the slack upper belt.

A forked yoke, engaging a spool on the pulley assembly, supplies the lateral belt shifting motion without interfering with the angular, vertical motion of the assembly as the idler moves with the belt.

With this design permitting the use of an idler, the excessive drop in machine speed was eliminated and uniformity of buffing was improved. The belt tension, formerly held at a maximum to prevent slippage, was reduced, with a favorable action on the pulley bushings, and on the belts themselves.

Flexible Door Extension Takes Bumps

Contributed by J. M. McCulloch

MAINTENANCE COSTS on our overhead doors were suffering as a result of poor judgment by the plant truck

Strip of belting nailed to bottom of overhead door absorbs truck impact

drivers. Using the electric controls which permitted the stopping of the door in any desired position, the drivers often misjudged the height of the door, and drove into the bottom panels. This continuous damage to the door panels and guides was eliminated by the addition of a strip of rubber belting to the bottom of the door. The rubber belting easily absorbed the impact of the trucks whenever the driver's judgment was faulty and the door was too low to permit the truck to pass through.

Guard Elevator Shafts Completely

Contributed by Edward C. Walsh

AN IMPORTANT CONSIDERATION in the operation and maintenance of elevators is the proper safeguarding of shaft openings, particularly where building construction limits the height of the gate. In a situation of this type, standard doors often cannot be used. Many elevators have shaft openings guarded by gates from 2 to 4 ft from the floor, allowing too much unprotected area, and providing a dangerous hazard. And, in a great many cases, the usual folding doors or telescoping gates are not always the answer.

One way to provide protection at these undersize shaft openings is to construct a solid gate as high as possible from the floor, designed to

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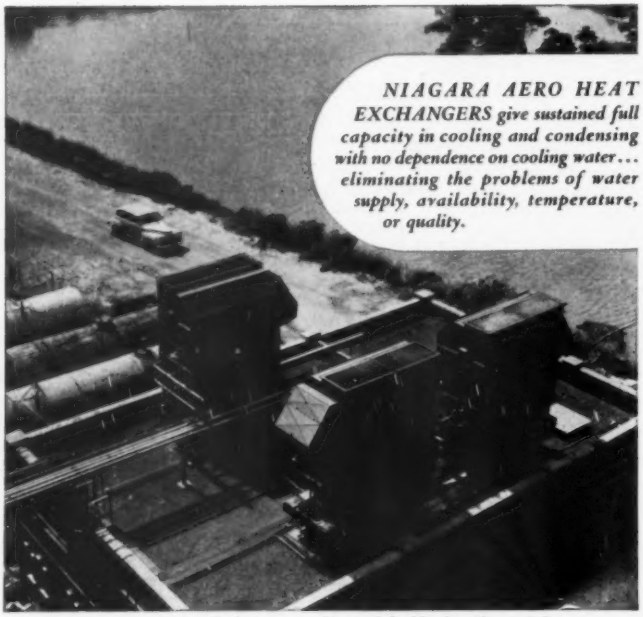
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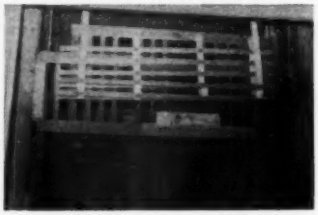
MAINTENANCE & OPERATION

(M and O begins on page 48)

provide maximum clearance under the gate when it is completely raised. Then, to complete the protection, hang a slat and tape guard between the top of the shaft opening and the top of the gate. With this guard in place, the entire opening is protected, and when the gate is raised, the slats drop neatly in place against the gate, out of the way.

In a more elaborate system than described here, the guard may be built more along the lines of the Venetian blind, with the slats horizontal, cut to ride in the gate track



Elevator gate in raised position. Taped slat guard drapes against face of gate

and nest on top of the gate when in the raised position.

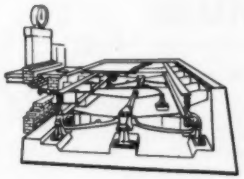
Either type of guard, when installed over a small shaft gate, tends to discourage those workers who stick their arms and heads over the low gate, into the elevator shaft.

Truck Hoisting Speed Increased with Voltage

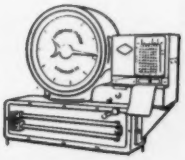
HOISTING SPEEDS of fork trucks are a critical consideration in plants, warehouses and shipping departments were large volumes of pallet-loaded materials must be moved quickly each day. Any method for saving time by speeding fork-truck operations results in appreciable yearly cost savings.

According to the Mercury Manufacturing Co., the critical consideration in hoisting speed is not so much the weight or the operational capacity of the truck, but rather the rated voltage of the power source. Because the lifting speeds of battery-powered fork trucks are almost directly proportional to the impressed voltage for a given load, higher voltages will provide faster lifting speeds.

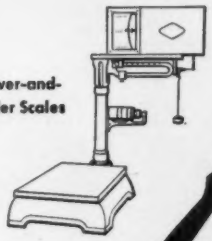
However, it is not always more economical to operate fork-truck lifts at the highest possible speeds. There are many installations where the capacities of existing equipment are equal to and even greater than the plant's most critical material-handling needs. Therefore, in cases



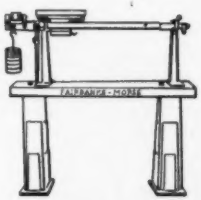
Truck Scales



Printomatic Dial Scales



Over-and-Under Scales



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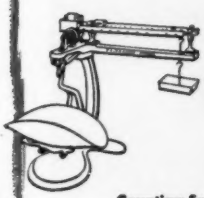
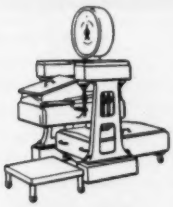
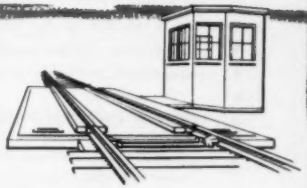


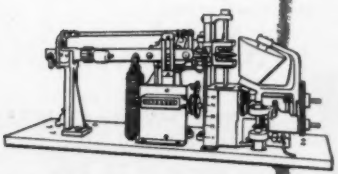
Counting Scales



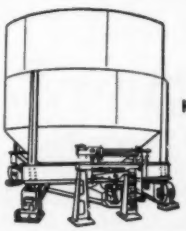
Weigh Can Scales



Railroad Track Scales

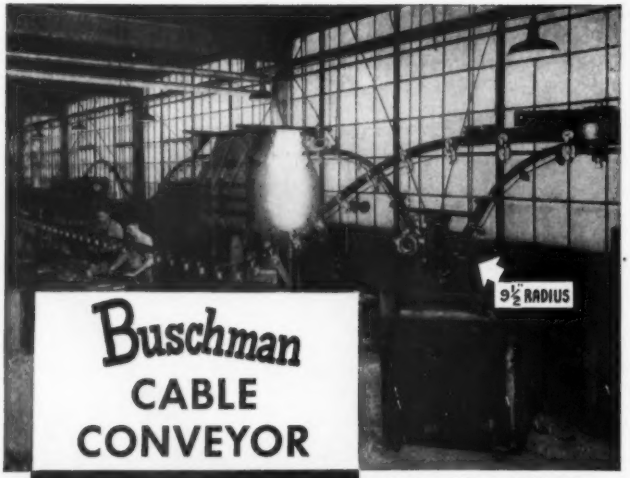


Belt Conveyor Scales



Hopper Scales

Fairbanks, Morse & Co., 600 South Michigan Avenue, Chicago 5, Illinois



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When Federal Motor Truck Company replaced slow, costly hand dipping of parts with a Buschman Universal Cable Conveyor and a "Quick Dip," production soared to 3½ times the former rate. In a tank just 24" square, parts ranging from 3" to 42" get a plastic coating that meets rigid military specifications for overseas shipment.

And that's just part of the story on this low cost Buschman overhead Cable Conveyor. Each day it speeds thousands of parts through loading, dipping, drying oven, inspection and wrapping operations. Like all Universal Conveyors, it was shipped in stock sections, quickly erected by plant personnel. It was ready for production in a fraction of the time and cost of conventional trolley conveyors. When conditions require, it can be changed overnight to fit future production.

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MAINTENANCE & OPERATION

(M and O begins on page 48)

such as these, it would not be wise to install larger batteries.

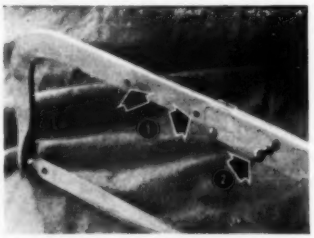
In plants, warehouses and shipping departments where fork trucks are in almost constant use, any gain in time or speed will allow the same number of trucks to do considerably more work. For an example of how a larger power source can increase fork-truck hoisting speeds, consider the speeds of a 5000-lb truck under two voltage conditions.

When powered by a 30 v industrial battery, the truck has average hoisting speeds of 29 fpm with empty forks and 14 fpm when loaded to capacity. But when powered by a 36 v power source, the same truck can lift its unloaded forks at a speed of 34 fpm and capacity loads at 18 fpm. This represents a hoisting-speed gain of about 17 per cent.

Hacksaw Frame Positioner

Contributed by F. E. Riley

WHEN CHANGING blades in an adjustable hacksaw frame, the problem of holding the frame rigid often becomes one of difficulty. With a slight



Holes in frame (1) receive cotter key (2) to prevent frame from jack-knifing

modification to the frame, its rigidity can readily be maintained while the blade is not in the frame.

With the frame adjusted to its several lengths, a hole is drilled through the frame to receive a loosely fit cotter key. Thus, if a cotter key is slipped into the hole prior to removing the old blade, the frame remains rigid while the new blade is being inserted.

Easy On the Man, Easy On the Shaft

Contributed by Thomas Manning, Allis-Chalmers Manufacturing Co.

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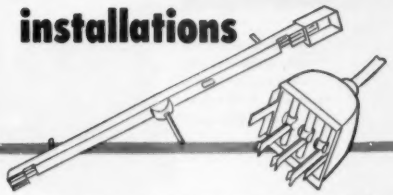

Midget Size FA POWER PLUGIN Busduct is the ideal system of power distribution for small machines and other similar plant equipment.

Underwriters' Laboratories approved, this modern system of power distribution provides 60 amp., feeder capacity for 2, 3 or 4 wire systems for ½ to 3 H.P., 240 volt motors, AC or DC with conventional type fuses and 7½ H.P. maximum for motors with dual element fuses.

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Midget Size FA POWER PLUGIN Busduct is only 3½ inches wide and 2 inches deep in size. It is available in five and ten foot sections with plugin outlets every twenty inches thus permitting machines to be moved in and out of production lines without slowing down or delaying operations. Special lengths and closer spacing of outlets are also available for application on production benches and equipment.

Contact your nearest FA representative, listed in Sweet's, or write for Bulletin No. 704, for further information on this economical, flexible system of power distribution.

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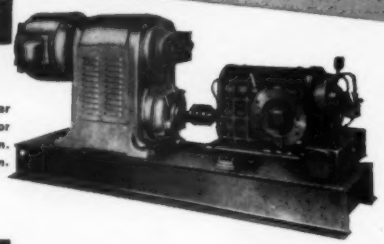

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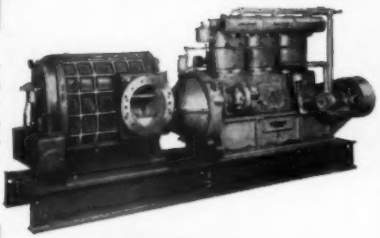
Standardaire Blower with Climax Engine using sewage gas—to deliver 2100 c. f. m. at 720 r. p. m.



for DIESEL ENGINES

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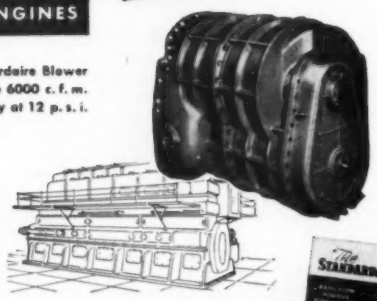

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MAINTENANCE & OPERATION

(M and O begins on page 48)

Sledge hammer blow, struck from correct working height, drops test shaft from impeller to wood-lined pipe section

fans, and wheels, after shop tests.

The adjustable platform raises the worker to the correct height to wield the sledge, and the wooden lining bolted inside the steel pipe section protects the ends of the shaft, as it falls from the impeller.

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Photo: Baker Industrial Truck Div.

Fork truck becomes self-service elevator when equipped with remote control

Cable reels, mounted on the truck frame, house the cable, and hooks on the truck uprights hold the control box when not in use.

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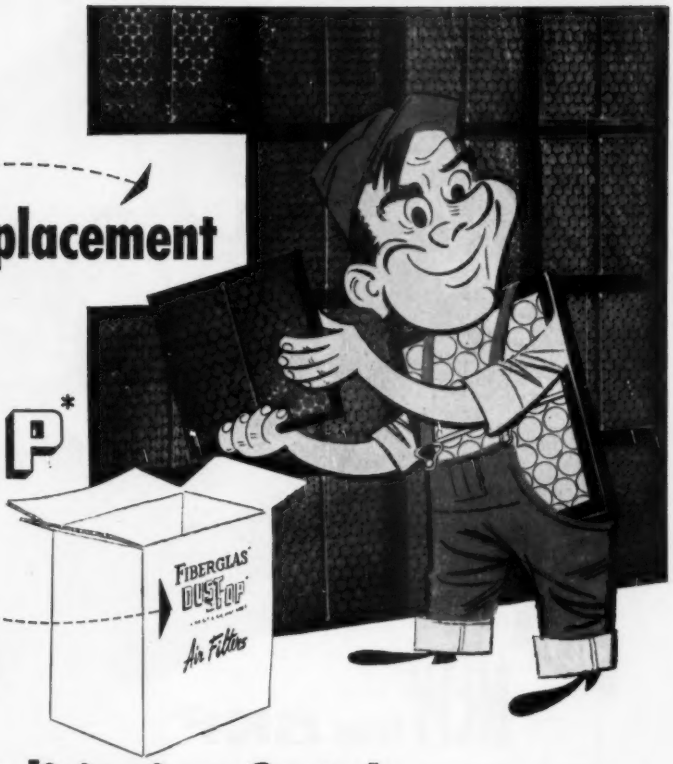

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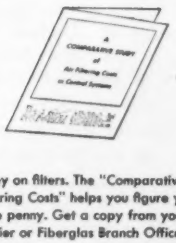

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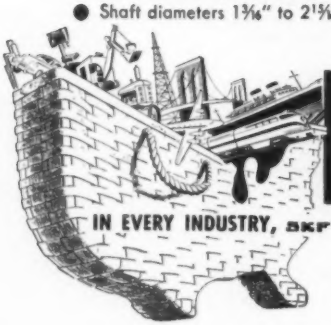
Detailed illustration of rotating flinger and RED SEAL—the extremely light tension contact seal.



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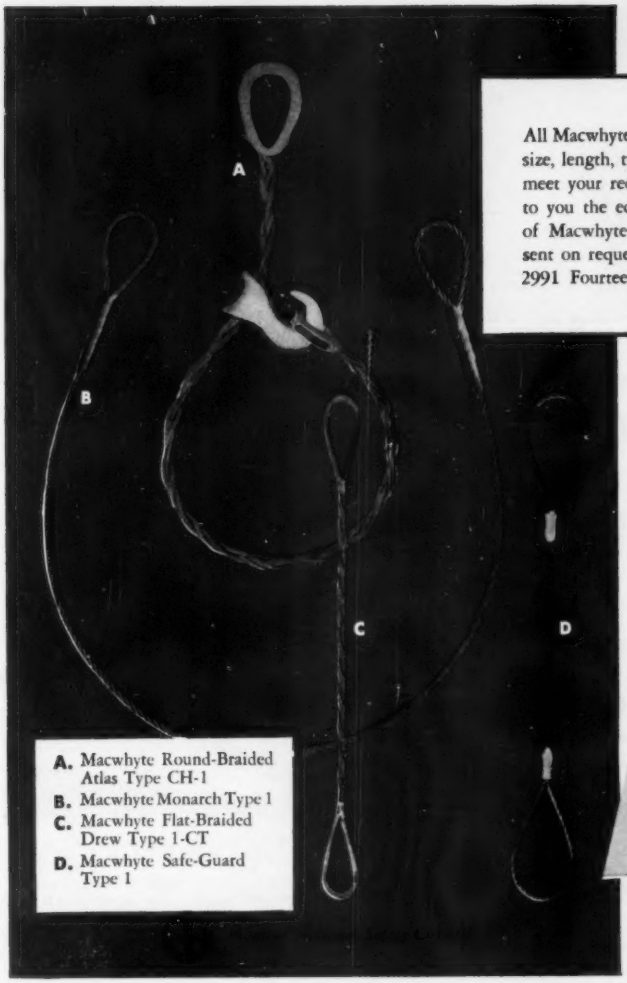

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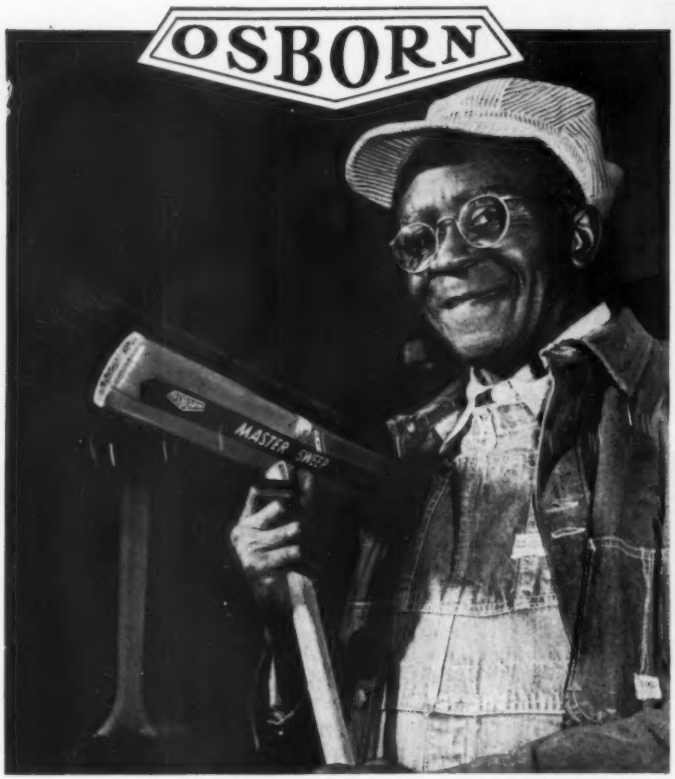

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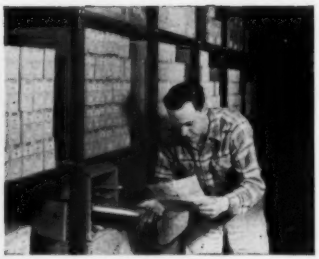


YOU'RE SURE to cut inventory and save delivery time when you order OSBORN brushes from your INDUSTRIAL DISTRIBUTOR. He carries a large stock to supply you with the right types of brushes promptly . . . paint brushes, maintenance brushes and power brushes.

YOU'RE SURE to get top quality in OSBORN brushes because their workmanship and materials are backed by 60 years of OSBORN service to Industry.

YOU'RE SURE to save money when you "Mass Purchase" your Osborn brushes along with other industrial supplies from your INDUSTRIAL DISTRIBUTOR. You cut red tape and save.

You can't stop a raging fire with a garden hose

You can't stop corrosion with ordinary paints . . .

it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings . . . they can't protect surfaces against the ravages of rust for any appreciable length of time.

But Bitumastic Coatings can!

FIRST—Unlike maintenance paints, Bitumastic® Protective Coatings are specially formulated from a base* of coal-tar pitch that is, for all practical purposes, impervious to water. When you keep moisture away from an exposed surface, you *stop* corrosion.

FURTHER—Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable. And these coatings provide up to 8 times the film thickness of conventional paint coatings.

FINALLY—Bitumastic Coatings stop corrosion caused by moisture—acid fumes—alkaline fumes—corrosive soil—salt air—heat.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information.

**Hi-Heat Gray contains a metallic base.*

SEND FOR SET OF FREE BOOKLETS!

Koppers Company, Inc., Tar Products Division
Dept. 823T, Pittsburgh 19, Pa.

Please send me, without charge or obligation, your booklets on corrosion prevention.

Name.....

Address.....

City.....Zone....State.....

KOPPERS BITUMASTIC PROTECTIVE COATINGS

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 823T, Pittsburgh 19, Pa.

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

Modern Power Centers

simplify change-over to higher voltage!

Section by section change-over of their plant from 220 to 440 volts was the deciding factor when a large Midwest steel fabricator installed Westinghouse Dry-Type Power Centers. But there were other considerations behind the move.

In the first place, operations had been growing steadily for the past six years, and plans called for further expansion. The old substations, having grown like Topsy, were trouble spots.

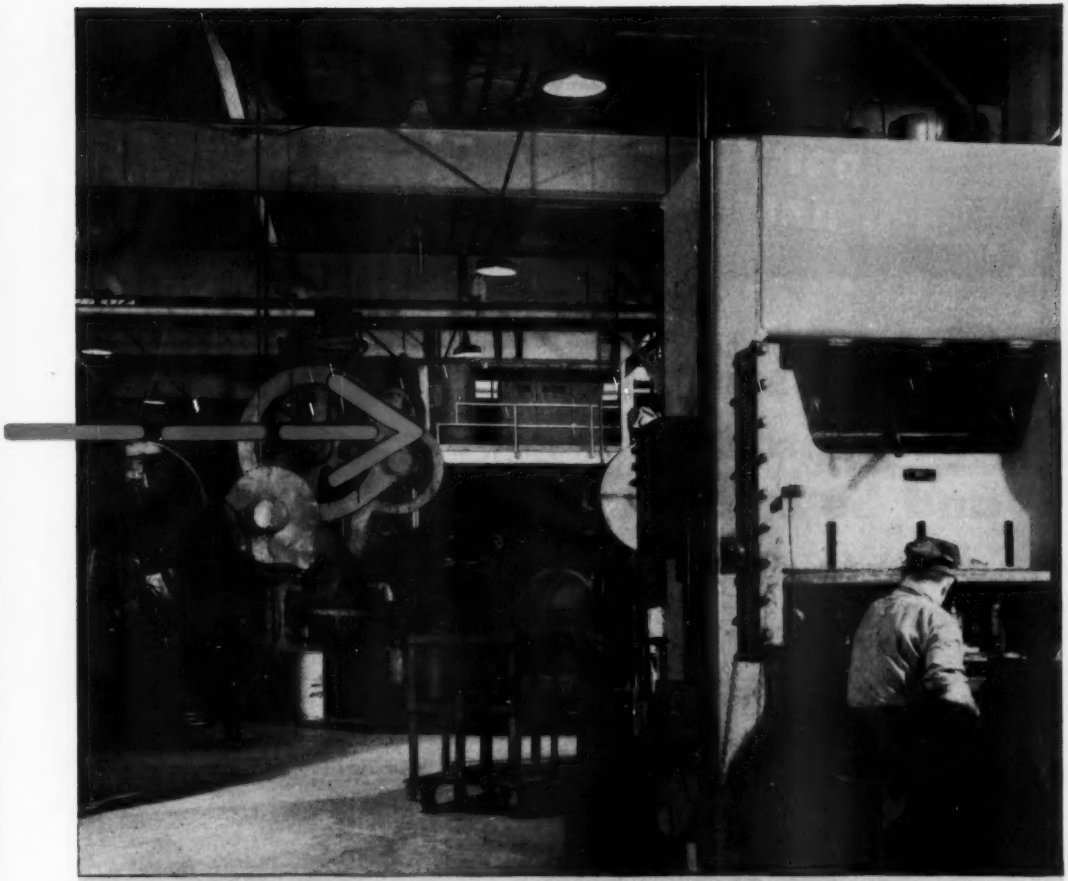
They chose Westinghouse Dry-Type Power Centers because the lightweight, compact units could be installed on raised platforms within the plant, close to the loads they serve. This eliminates the necessity for vaults, catch basins and flues which might impede the flow of work. Shorter secondary leads resulted in a copper saving that covered a good share of the installation cost. Shorter secondaries, too, reduced line losses, improved regulation.

Installation of separate power centers, each serving its own area, made the change-over easy, without interrupting production in other sections. And the flexibility of the new power centers gives greater freedom for future expansion.

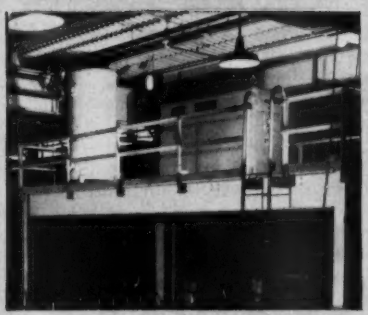
Check your own distribution system. You, too, may find excessive losses, poor regulation and outmoded equipment adding hidden operating costs. Your Westinghouse representative will be glad to show how you can make modern power centers pay. Call today, or write for booklet B-4428, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70636

YOU CAN BE SURE... IF IT'S Westinghouse

POWER CENTERS



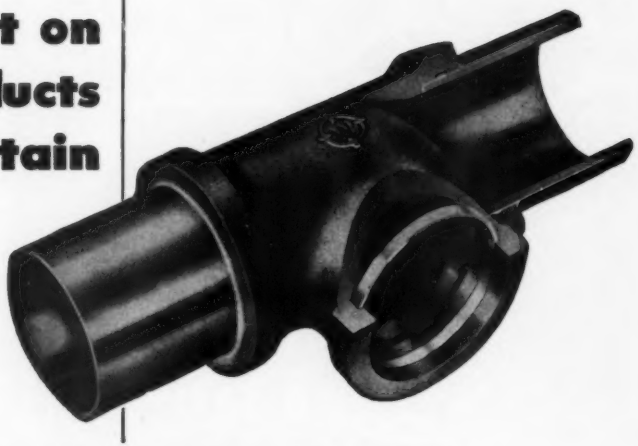
One of the outdoor substations which "just grew" as the load expanded, until they became costly, inflexible and inefficient. Modern power centers replaced these; eliminated their problems.



Westinghouse Dry-Type Power Centers, located on raised platforms close to the load they serve, provide maintenance-free dependability and economy, with flexibility for future expansion.

DON'T BE SATISFIED WITH HALF-WAY MEASURES...

insist on Walseal® products and be certain



– the FACTORY INSERTED Ring insures FULL PENETRATION of the Silver Alloy . . . a perfect joint

Today, contractors . . . builders . . . architects are using brazed connections, in ever increasing numbers on their brass and copper pipe runs. However, they must be certain that the correct brazing alloy is used; that the joint has penetration of alloy up the shoulder of the fitting.

That's why more and more are turning to Silbraz® joints made with Walseal valves, fittings and flanges which assure the proper amount of alloy with no waste. They know that the finished joint not only will withstand hydrostatic pressure, but it will also withstand terrific impact and vibration – in fact, no correctly made Silbraz joint has ever been known to creep or pull apart under any pressure, shock, vibration or temperature which the pipe itself can withstand.

Furthermore, it is a relatively simple operation to make a Silbraz joint – no heavy scaffolding need be erected . . . just cut the pipe, flux, assemble, then braze, following the technique recommended by the Walworth Company. A silver brazing alloy – FACTORY INSERTED – in each port flows out when heated with the oxyacetylene torch, making a joint that is stronger than the pipe itself . . . a one-hand operation, with the mechanic out of the path of the deflected heat – at all times.

For full information about Silbraz joints made with Walseal products, write for Circular A-1.

WALWORTH

valves and fittings

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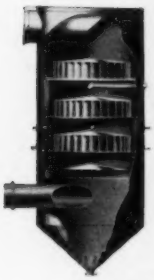
SEE OUR CATALOG IN SWEET'S



MULTI-WASH *Systems*

FOR SAFE, EFFICIENT, ECONOMICAL CONTROL OF HAZARDOUS DUST AND FUMES CONDENSIBLE VAPORS OR SOLUBLE GASES

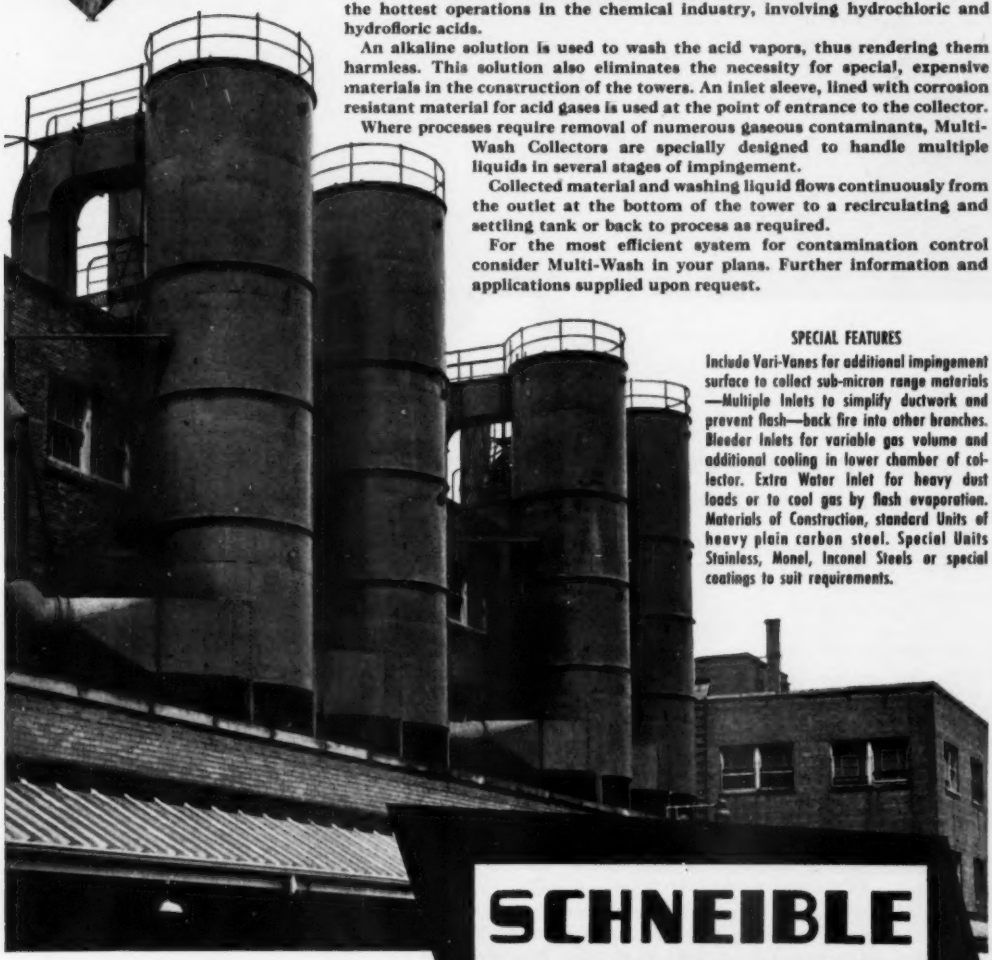
This battery of *four* Multi-Wash Collectors are handling vapors from one of the hottest operations in the chemical industry, involving hydrochloric and hydrofloric acids.

An alkaline solution is used to wash the acid vapors, thus rendering them harmless. This solution also eliminates the necessity for special, expensive materials in the construction of the towers. An inlet sleeve, lined with corrosion resistant material for acid gases is used at the point of entrance to the collector.

Where processes require removal of numerous gaseous contaminants, Multi-Wash Collectors are specially designed to handle multiple liquids in several stages of impingement.

Collected material and washing liquid flows continuously from the outlet at the bottom of the tower to a recirculating and settling tank or back to process as required.

For the most efficient system for contamination control consider Multi-Wash in your plans. Further information and applications supplied upon request.



SPECIAL FEATURES

Include Vari-Vanes for additional impingement surface to collect sub-micron range materials —Multiple Inlets to simplify ductwork and prevent flash—back fire into other branches. Bleeder Inlets for variable gas volume and additional cooling in lower chamber of collector. Extra Water Inlet for heavy dust loads or to cool gas by flash evaporation. Materials of Construction, standard Units of heavy plain carbon steel. Special Units Stainless, Monel, Inconel Steels or special coatings to suit requirements.

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PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

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ROCHESTER GAS & ELECTRIC SPECIFIES . . .

GUN-PAKT EXPANSION JOINTS

USER OF GUN-PAKT JOINTS SINCE 1935 ORDERS 16 MORE FOR NEW STEAM LINE

This prominent New York State utility has been using Yarway Gun-Pakt Expansion Joints for the past 17 years. Now they have ordered 16 more (12", max. working pressure 400 psi) for a new steam distribution line in their expanding system—pretty good proof that Gun-Pakt Joints give trouble-free, economical service.

Central station heating plants, institutions and industrial plants all over the country are finding Gun-Pakt Joints offer *maximum protection* with *minimum maintenance.* Gun-Pakt Joints are *rugged, strong* joints. They offer freedom from shutdowns because they are *serviced under full steam pressure.* Maintenance costs are low; one utility that kept accurate records found their maintenance costs to be only 65c per year per joint!

To service a Gun-Pakt Joint you simply insert a plug of packing, twist a wrench, and the joint is tight!! . the job done . . . all without taking pressure off the line.

Yarway engineers, conveniently located near you, are constantly working for better, more profitable steam plant operation. Call on your Yarway man for friendly, helpful advice.

Yarway Gun-Pakt Expansion Joint installed in Rochester Gas & Electric Corporation's Broad St. subway line. 10" joint, 225 lbs. pressure, 450°F.

YARNALL-WARING COMPANY
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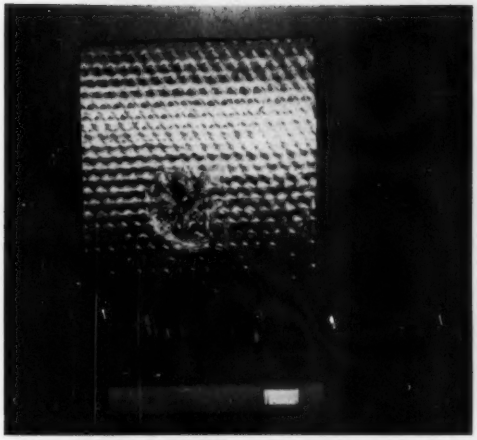
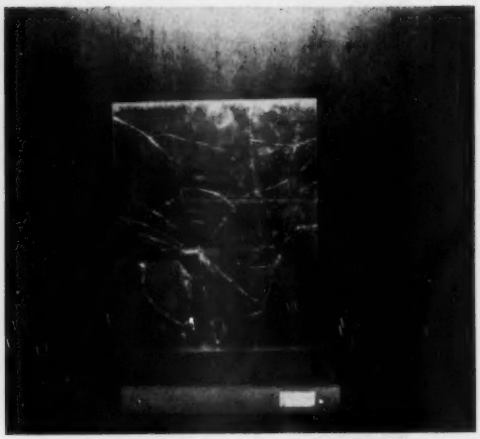
YARWAY SERVICE GOES ALL THE WAY . . .



WIRE-GLASS Shattering this wire-glass with a blow from a rawhide hammer showered the surrounding area with glass slivers and powdered glass



COATED GLASS In comparison tests, this glass pane sprayed with liquid plastic stood up much better under the test than the wire-glass

Safety Is Sprayed on Glass Panes

Here is one answer for obtaining safety glass at a savings . . . Perhaps you can make use of this idea . . . Just spray glass panes with liquid plastic material

By **FRANKLIN E. CROOKS**, Plant Service Manager, Post Cereals Div.

THERE ARE MANY industrial plants which must constantly contend with the problem of foreign material entering their finished products. And Post Cereals Division of General Foods Corp. is no exception.

Some months ago, inspections by our Sanitation Department revealed the possibility that broken window glass could enter the food streams. The immediate action was to bolt shut all windows directly above openings into the grain tanks. This prevented the windows from slamming shut and shattering glass into the tanks. However, this measure discounted the human element—it would not stop a window washer from breaking a pane of glass from the outside with a ladder.

The Sanitation Department, working with the Maintenance Department, immediately checked several possibilities to remedy the situation. They considered wire-glass, plastic glass, and other materials of this nature, but all these considerations were discarded for one reason or another.

Their next thought was the possibility of a sprayed-on plastic material. We had some liquid plastic used for rust-proofing machinery. We tried spraying the plastic on several panes of 14 in. by 20 in. double-strength glass.

After letting it set for several days, the glass was broken by various means to determine what effect the plastic material would have on the reduction of shattering. Results showed that the plastic material was very satisfactory as a shatter retardant, and it actually held the broken pieces together, except in the case of a very severe blow.

The color of the plastic material first used was transparent blue. Tests of a second material, permanent clear, proved it to be just as satisfactory as the first plastic. In fact, the tests were so gratifying that the company immediately went ahead and sprayed all windows in the head houses of the grain tanks, plus some additional areas in strategic spots in processing areas where contamination of food might occur if windows were broken.

The cost of applying two coats of this liquid plastic on a 14 in. by 20 in. pane was only $.01 for labor and $.015 for material. A spray gun with an air pressure of 30 psi was used for applying the plastic to the inside surface of the glass.

In order to obtain factual data on the effective life of this material after application to the surfaces of window glass, a series of tests was started. A number of panes of glass were coated with the liquid plastic. At regular intervals, panes of the coated glass were broken under controlled conditions and compared with a pane of wire-glass broken under identical conditions. After five months of testing, there was no apparent deterioration or loss of effectiveness of the plastic coating. Tests to determine the lasting qualities of the coating are being continued.

Comparison tests, consisting of breaking both wire-glass and the coated glass with a blow from a rawhide hammer, showed that only a very small trace of glass was not retained by the plastic coating. When the wire-glass was broken, however, considerably more powdered glass and fine slivers showered the surrounding area than was experienced with the coated glass.

Keep Your Copy Intact

Readers wishing tear sheets of any article appearing in the issue for their personal file may obtain them by indicating the item desired on one of the post cards appearing in this issue. — Editors

A clipboard is made up for each individual order received. The clipboard holds the sales order, a picking slip for each of the items requisitioned in the order, in addition to the labeling and shipping tags

Layout, Equipment, Methods Spell Warehousing Efficiency

Republic Supply Company of California has adapted its employees, its warehouse, its equipment and its handling methods to performance of a specialized job

MAYBE YOU'VE already asked your young son or daughter, struggling through the first year of elementary economics, "What's division of labor?" They'll know the answer because the division of labor theory takes up a good many pages in every elementary text on economics. But applying this venerable rule-of-thumb to the warehouse isn't quite so easy.

Yet at The Republic Supply Co. of California (at Los Angeles) every man in the shipping and warehousing departments is a specialist—confined to the narrow, efficient limits of a single job. This specialization—division of labor put to practice—has reduced Republic's warehousing time, speeded shipments, streamlined both processes. The equipment, too, is specialized.

A typewritten original sales order; ditto-printed copies of each individual item on the order; and tags and labels made up in advance are one phase. But how does Republic's simplified paperwork system key warehousing operations? The answer lies in one statement: Republic's simplified paperwork system was designed to permit specialization in the warehouse—to maximize efficiencies growing out of a well-managed division of labor.

Warehousing specialization begins with the warehousing scheduling clerk, himself a specialist. The scheduling clerk, his office in the warehouse, receives sales orders, separate unit ticket slips (ditto printed) for each item on the sales order, and pre-addressed shipping tags to go with the packaged order. Working primarily with only the ditto-printed item slips, the scheduling clerk arranges slips pertaining to each order in picking sequence—according to where bins and shelves are located around the 90,000 sq ft of Republic's big warehouse.

One of the specialized items developed at Republic Supply is this cart. Removable partitions keep orders straight

Idea is to arrange slips so that the picker—likewise a specialist—can gather up items in sequence with minimum steps, and no back tracking. Even the picker's pick-up cart is designed for sequence picking. Each sales order is assigned its own clipboard. Clipped to the board are: the individual item slips arranged in picking sequence; the sales order; and various shipping tags and labels pertaining to the order. Clipboarding each order has speeded picking, kept orders together, retained processing papers in good condition.

The scheduling clerk's job is: 1—To arrange item slips in picking sequence; 2—To assign each picker just enough clipboards—thus sales orders—to fill his cart. No more, no less. 3—Release these orders to pickers in time to get the order out by shipping date. Sequencing pick-

ing slips means the scheduling clerk must be thoroughly familiar with warehouse stock and layout. For oftentimes a picker may be assigned three, and perhaps more sales orders. In this case, individual item slips are removed from each board and put in sequence of location.

All the picker is concerned with are these slips—for from these he collects the ordered items. As he picks each item, he quickly sorts the slips by order number, places the material in that section of his picking wagon reserved for each separate order, then snaps the slips on the proper clipboard. Then he rolls the filled cart to a special counting-packing section.

The picture of Republic's specialization quickly shapes up: 1—The scheduling clerk is concerned only with arranging item slips in order of picking sequence and in assigning cart-load size orders to the picker; 2—The picker, in turn, is solely concerned with the item slips; 3—The checking-packing specialists are concerned only with verifying, counting, weighing, packaging the items; 4—And finally, when shipping takes over, the shipping clerk's sole concern is with boxes, cartons, barrels and pallet-loads. This is the kind of division of labor specializing that spells "efficiency."

The picker gathers up his assigned clipboards from the scheduling clerk's office. The picker gets an empty cart and moves from bin to bin, shelf to shelf, filling the individual slip orders. Picker carts at Republic are Republic-designed. They are rubber-tired, made mostly from aluminum, and have removable sections so that orders may be grouped individually in separate sections of the cart. When the picker finally wheels his cart to the checking-packing section, a clipboard is laid atop the picked material in each section of the cart—signifying a complete order. Carts have space beneath for large, bulky items, and compartments which contain burlap bags, paper sacks, tags, labels, etc.

Pickers push their carts to the checking-packing section. Design of this section is unique. Carts are routed through an aisle, on either side of which are three checking-packing stations. Since the cart's top is sectionalized, checkers-packers can work from both sides. The work is made easy because cart height is exactly the height of the checking-packing tables (37½ in.).

Checkers-packers check the count on all collected items and check sizes by measuring when necessary to be sure they correspond with the order. Then they package each item, tag it, and note on the sales order whether the item has been boxed, cartoned, put in barrels, or in the case of large industrial materials, if they've been left unwrapped. The clipboards are then returned to the shipping department.

Another of the Republic Supply-designed properties is this cart-high desk. Two, sometimes four, checkers-packers can work from both sides of the same cart

Once packaged, the order is carried to the collecting floor, a few feet from the checking-packing department. The floor is divided into 10 sections—0 through 9. Location of packaged orders is determined by the last digit in the original sales order—a number stamped on each shipping tag. All packaged items pertaining to Order No. 33456, for example, would be placed in the section number "6"—because "6" is the last digit of the sales order number. When shipping is ready to dispatch the order, clerks know which one of the 10 sections (indicated by the order's last digit) contains the material required to fill a particular order.

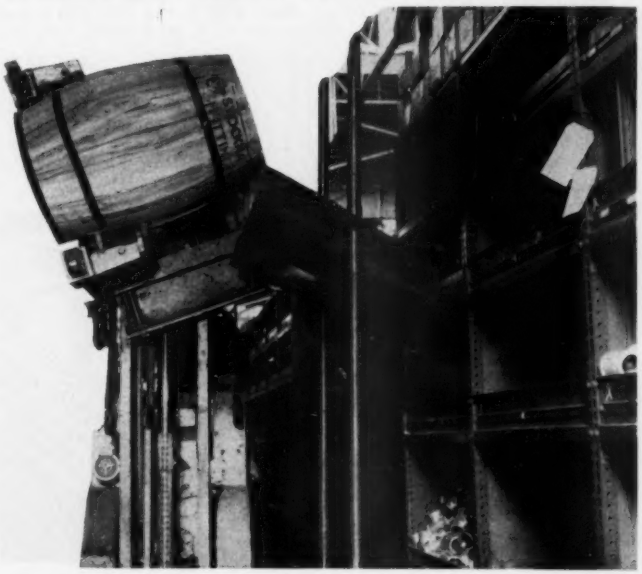
Checking-packing tables, arranged on either side of the cart aisle, are designed for efficiency. Tables are 37½ in. high; 20½ ft long, and have three cut-outs on each side where the checkers-packers stand. Cut-outs are 29-in. wide, 22-in. deep. Tables are 36-in. wide.

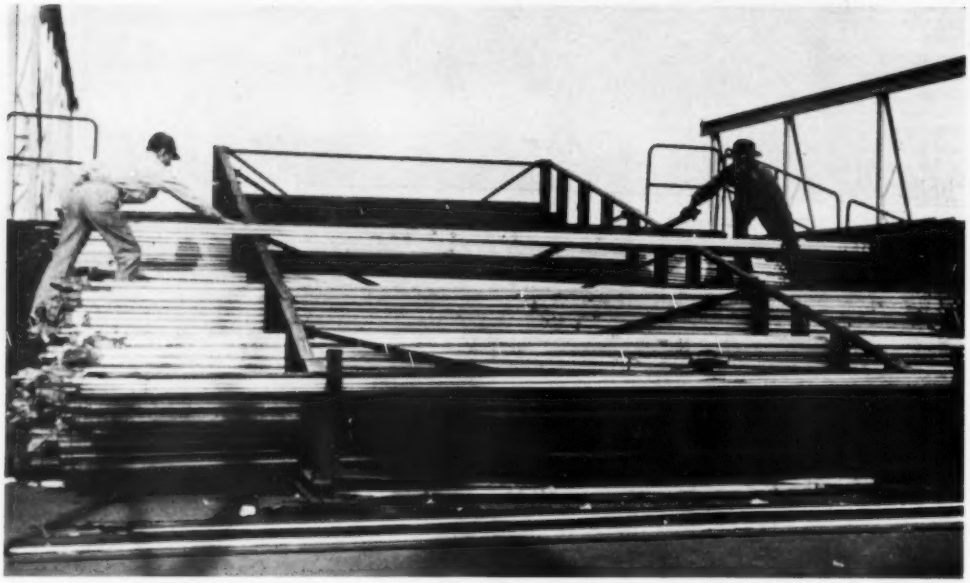
Big advantage of breaking sales orders down into individual item slips is that several departments may be compiling an order simultaneously. Thus, slips calling for piping go to the pipe yard; slips noting a wire-rope order go to the wire-rope department, etc.

This system readily adapts itself to Republic's six categories of industrial supplies: pipe valves and fittings; tools; mechanical rubber goods; wire rope and rigging; machinery; and oil field supplies.

Each department within the warehousing setup handles its own specialty, and puts material han-

A quick method of replenishing supply of small parts is provided by lift truck attachment which lifts barrel, tilts it so contents slide down chute into bin



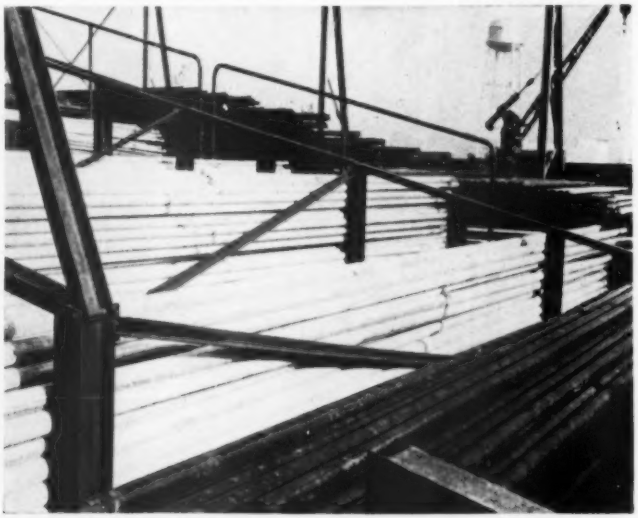


Specially-constructed small-order pipe racks for the efficient low-cost filling of small order lots. After workers select the necessary sizes, note how the completed order of pipe is collected by the leaf spring hooks at the bottom of the incline

dling devices to maximum use. Typical is a specially designed small-order pipe assembly rack. One problem confronting any pipe yard is handling and making up small orders. A typical small order may include a half dozen lengths of pipe in as many different diameters and types. Ordinarily, collecting this order from the large bundles is a time-consuming, extremely expensive job and almost always requires two men working with overhead hoists. At Republic, small-order pipe is made up on the special rack. Essentially, this rack is an inclined steel platform, with 11 sections, each holding a common, often called-for size and type of pipe. Pipe is stored in these sections in relatively small quantities. Two steel rails slope down the rack, and stairways at each side give access to the pipe.

From the side, the rack looks like a steel right triangle—8-ft high along the side of the right angle—and sloping by a ratio of 1:3.85 to the ground, where a leaf spring collects the various sections of pipe. Two men merely lift a joint of pipe up through hinged gates built into the sloping steel rails, let the pipe roll by gravity to the leaf spring collecting point. That's all the individual handling that's necessary. Once an order has been collected, it's bound up, then hoisted on trucks for delivery.

This close-up of small-order pipe rack shows how gravity rails are hinged above each of the individual pipe storage sections to allow removal of pipe



Dimensionally, the small-order pipe rack is 25-ft wide (takes 21-ft lengths of pipe), and 25-ft long, sloping from a height of about 8-ft at the rear to about 2-ft at the collecting point. Smaller, light-weight pipe is stored in the rear of the storage rack, while heavier pipe is kept in the lower sections of the ramp.

Another handling innovation, designed by Republic, fills small-item bins and shelves in the warehouse. This chute-like device stands on two height-adjustable stanchions, which are set on a portable, four-wheeled frame. A fork truck, with double hoist, hydraulic clamps and equipped with an electrical turning device, grabs a barrel of bolts, lifts it to the bin, turns the barrel through 360 degrees, and empties it via the chute into the shelves.

These shortcuts, combined with specialization, have meant greater efficiency and speedier shipments.

Ed Williams demonstrates the tool which he suggested for dressing emery wheels. Control of operation and diameter uniformity is possible with this unique device

Previously, the wheel dressing operation was done by first turning the grinder table a few degrees with respect to the grinding wheel surface . . . With the present device, the wheel can be dressed without turning table, thus eliminating errors

Shop-Made Wheel Dresser Does the Trick

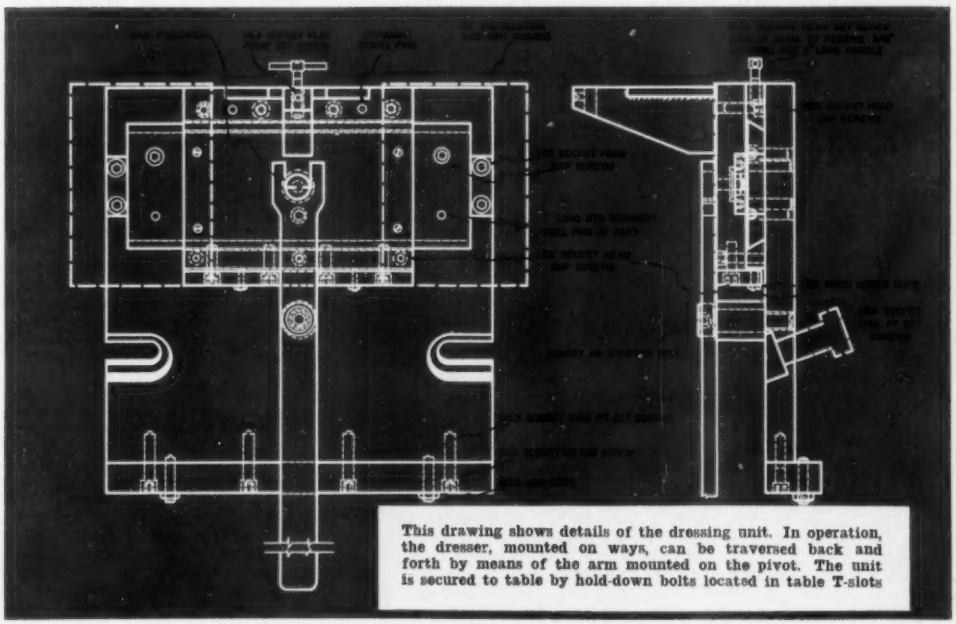
A TOOL—made in the company shop—for dressing grinder wheels is helping Firestone Tire and Rubber Co. do the job with greater accuracy and with surer control over the operation. This device is the result of the employee suggestion of Ed Williams.

Before the dresser unit was adopted, it was necessary in grinding a taper to turn the grinder table a few degrees with respect to the grinding wheel surface. Appreciable errors occurred because of the inaccuracy of this method. With the present unit, the wheel is dressed without the need of turning the table, thereby eliminating possible errors.

With this tool, the operator is able to control the operation and get diameter uniformity. In operation, the dresser, mounted on ways, can be traversed back and forth by means of an arm mounted on a pivot. The dresser is secured to the table by hold-down bolts located in the table T-slots.

When the unit is used to dress a taper wheel, the table upon which the unit is mounted remains stationary and the dresser is swung back and forth against the surface of the wheel.

To dress a straight face grinding wheel, the operator merely locks the dresser in a permanent position and moves the dresser and the entire table back and forth.



This drawing shows details of the dressing unit. In operation, the dresser, mounted on ways, can be traversed back and forth by means of the arm mounted on the pivot. The unit is secured to table by hold-down bolts located in table T-slots

Distribution ducts in spinning room distribute quantities of air at proper temperature and relative humidity

Two huge buildings needing high humidity coupled with good comfort conditions posed a problem for this plant . . . Separate installations combined with good engineering solved it

Tough Air Conditioning Problem Solved at Spartan Mills

By JOHN M. CAUGHMAN, General Superintendent, Spartan Mills

IT IS THE OPINION of almost everyone in the air conditioning industry that textile air conditioning is always difficult because the conditions to be met are exacting. But the job done at Spartan Mills, Spartanburg, S. C., was a tougher job than usual for a variety of reasons.

Spartan Mills has two very large buildings, nearly identical in size, called Plants Nos. 1 and 2. They are cotton mills and each is a complete manufacturing unit from carding through weaving. They produce carded broadcloths, class "C" sheeting and similar fabrics.

Some of the factors which made this job difficult were the large rooms and the fact that the two buildings are fairly close together but not sufficiently so to permit the use of an apparatus building to serve both. It was also apparent that tremendous amounts of conditioned air would have to be circulated on the four floors of each building.

In addition to these, the normal problems encountered in textile air conditioning were present, and Spartan Mills wanted to provide the best type of air conditioning possible. This meant that in the card rooms it would be necessary to maintain a constant relative humidity and temperature with uniform distribution of air. This had to be done without interfering with the carding process which is especially subject to drafts. A small current of air at a low level will completely disrupt the operation of the cards.

In the spinning rooms it is necessary to hold a fairly high humidity of 60 per cent which calls for large amounts of moist air. Spinning areas also have a tremendous heat gain from electrical equipment in the room. In fact, one of the most concentrated heat loads found in air conditioning problems exists in textile spinning rooms. Uniformity is also required in spinning rooms so that there will not be any spots which are especially hot or cold, wet or dry. This is because the textile fiber is hygroscopic and will take on or give off moisture in accordance with the relative humidity of the surrounding atmosphere. The yarn which results from the spinning process must have the proper moisture content to produce uniformly good quality of fabric.

The handling of very large quantities of air also meant that the equipment must be well engineered and designed to keep the maintenance of the system at a reasonable level. To accomplish this it was found desirable to use large air conditioning systems rather than a great number of small systems. Although the air conditioning was designed primarily from the processing standpoint, this improvement naturally resulted in increased employee efficiency due to the better working conditions.

When the problem at Spartan Mills was first considered it was immediately decided that production space could not be given up for air conditioning apparatus. Consequently a four story apparatus tower was constructed mid-way along the side of each of the two large buildings allowing them to have separate systems for each floor. This feature was important because the conditions required for each floor are not the same.

In Plant No. 1 the first floor is a weave room and air conditioning is furnished by an air washer 14 ft high by 18 ft wide which handles 133,500 cu ft of air per minute. The air washer is the primary conditioning apparatus, while the complete system includes distribution ducts and means of boosting the evaporation in the room. Boosting is accomplished by mounting atomizers at the air outlets when the relative humidity is to be higher than 60-65 per cent.

In the weave room the air is distributed through aluminum ductwork. In order to maintain the 85 per cent relative humidity required for proper weaving evaporation is increased by the action of ninety

nine pneumatic atomizers at the outlet grilles. These atomizers also provide a flexibility in operation and control which would not be possible if air alone were used for temperature and humidity control. The atomizers, being mounted over the grilles, mix their moisture uniformly with the air delivered by the ducts. They also considerably reduce the amount of air required to cool and humidify the room.

Plant No. 2 has weave rooms on the first and second floors, and conditions similar to those in Plant No. 1 are maintained. The first floor weave room is conditioned by a central system using an air washer 11 ft high by 22 ft wide and handling 146,000 cu ft of air per minute. With it are associated 138 pneumatic atomizers to boost the evaporation. The second floor weave room has a smaller washer which handles 80,000 cu ft and has 100 atomizers.

The relative humidity is maintained at 85 per cent in these rooms. This allows of a room dry bulb temperature of 7 deg above the outdoor wet bulb temperature without refrigeration. This means that even though this system depends upon evaporative cooling the room temperature will not be over 79 F at a design maximum of 96 F dry bulb outside, and 72 F wet bulb.

Both plants have a card room on the third floor. The one in Plant No. 1 is conditioned by a central station air washer 10 ft high by 19 ft wide which handles 108,400 cfm. The one in Plant No. 2 is 10 ft high, 24 ft wide and handles 137,000 cfm. The relative humidity maintained in these rooms is 50 per cent. Maximum summer temperature is 89 F. Inasmuch as the relative humidity is only 50 per cent it has not been necessary to add the pneumatic atomizers to increase the moisture. Both of these rooms are cooled by refrigeration, a total of 350 being required.

Card rooms always have a heavy concentration of lint in the air and, although the air conditioning system greatly reduces the amount of free lint, there is always a tendency for it to collect in the washer where it is removed from the air stream. Automatic suction strainers have therefore been installed to reduce the maintenance of the air washers. These self-contained units permit high washer efficiency, uninterrupted operation, and prevent clogging of the many hundreds of nozzles in each air washer.

As mentioned previously, the spinning rooms have a heavy heat load due to the motors and as they are also located on the top floor of each plant they have an additional heat load from the sun on the roof, the walls and the monitors. The spinning room of Plant No. 1 is conditioned by two central station air washers placed side by side. Together they handle 260,000 cfm. The system was split so that two fans could be used to provide flexibility. Each fan and its ductwork handles approximately half of the room. This is desirable since one part of the room is devoted to filling spinning and the other to warp spinning. At present the whole area is maintained at the same condition but a change in fiber might require different conditions in the future and with the degree of flexibility it will be a simple matter to change conditions.

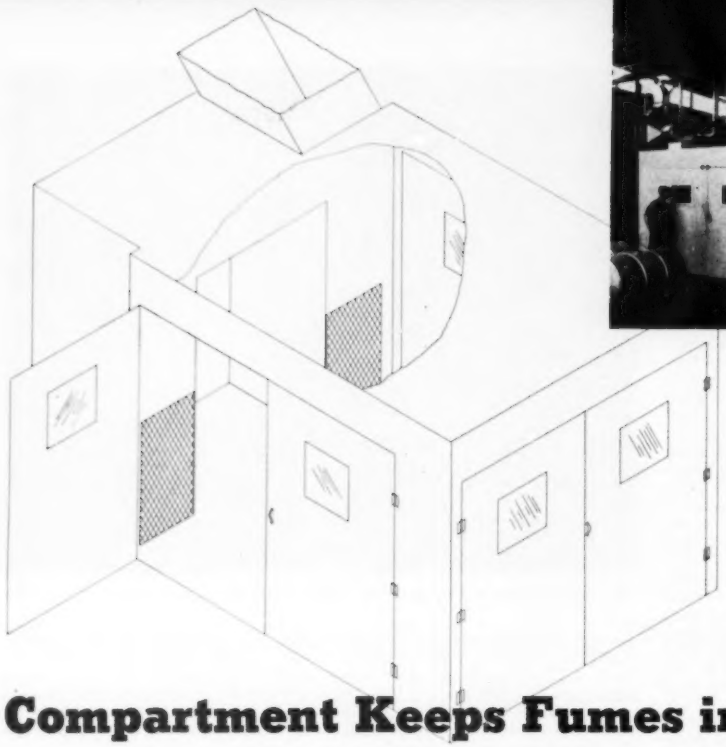
Both spinning rooms, in plants Nos. 1 and 2, are kept at 60 per cent relative humidity, and the system can maintain a room temperature 15 deg above the outside wet bulb temperature, which means a maximum design temperature of 87 F dry bulb in the mill. The relative humidity here is not high enough to make necessary the use of pneumatic atomizers.

The spinning room on the fourth floor of Plant No. 2 requires the largest single air conditioning system at Spartan Mills. It is also one of the largest single systems to be found anywhere in the world. The central station air washer is 18 ft

(Continued on page 162)

Air washer for No. 2 spinning room handles 315,000 cfm, is 18 ft high, 30 ft wide

Fans on each system draw air from washers and deliver it to working areas



Compartment Keeps Fumes in Place

Needed for this operation: Special enclosure with proper ventilation for machine using acids and liquids to treat tracing paper . . . Constructed: Compartment which kicks fumes out and permits easy access to machine

By OSCAR A. OLSEN, Plant Engineer, Charles Bruning Co., Inc.

IN MOVING INTO the new plant at Teterboro, N. J., we encountered a problem in ventilating a special machine compartment. This compartment was to house a machine that uses acids and liquids to treat tracing paper. When exposed to atmosphere, the vapors emitted could be toxic if allowed to become sufficiently concentrated. Therefore, before the paper coating department could go into production, it was necessary to build an enclosure and design a ventilating system for it.

The primary considerations in the planning stage were a satisfactory exhaust system and the maximum ready access to the machine: the operator must have a fast and simple means of reaching the machine, its parts, and the paper being treated. In other words, the structure must be consistent with the safety of the operator and the efficiency of the machine. Every detail had to be conceived with full-capacity, continuous operation, and minimum shut-downs in mind.

After many diagrammatic sketches the engineering staff came up with the following solution to these problems.

The machine compartment is constructed of ¾ in. plywood, and consists of a room approximately 10 ft long by 8 ft 2 in. wide by 8 ft 2 in. high. It contains about 765 cu ft. The ceiling is fully closed, and three sides of the enclosure are built with two doors which extend practically the entire length of each side. On the fourth side there is one door: the remainder of the side consists of the built-in air suction louvers. All doors have clear wire-glass observation windows and are equipped with screw-door catches. Located on the ceiling above the machine are three explosion-proof lamps. All the electrical equipment — switches, motor, etc. — is also explosion-proof. The structure is supported by four corner posts.

Since vapors and gases, being heavier than air, accumulate at floor level, it was necessary to exhaust them off the floor. Two exhaust ducts were constructed vertically, each rising to the level of the compartment roof. At the base of each duct is a 20 in. by 40 in. screened opening, through which the vapors are sucked. The two ducts are joined to a larger main exhaust duct at ceiling height. This larger duct extends to the roof of the plant building. It is 38 in. square, and is made of plywood and composition wall material.

Located on the roof is a propeller-type exhaust fan which sucks vapors through these ducts. This fan has a capacity of 12,000 cfm of free air, and is driven by a one hp, 220v, 3 phase, 60 cycle motor.

The velocity of air across the face of the screened openings in the compartment averages 750 fpm. Based on the velocity of air across the suction openings, the approximate air handled is 8,250 cfm. The fan gives the 765 cu ft of the compartment approximately 11 changes of air per minute.

Oil Purification System

Saves Oil, Boosts Output, Prolongs Pump Life

Vacuum pumps play an important part in the dehydration process of making streptomycin . . . However, because of progressive contamination of the oil the pump efficiency would drop, requiring a shutdown every 2 or 3 hours to change the oil . . . Installation of an oil reclaiming system insures continuous supply of clean oil

ACHIEVEMENT OF volume production while maintaining absolute purity of product is one of the big problems of all pharmaceutical companies manufacturing the so-called miracle drugs. E. R. Squibb and Sons uses high-speed vacuum pumps in its New Brunswick, N. J., plant for the manufacture of streptomycin. Using these pumps, the company is able to effect volume dehydration of streptomycin solution at temperatures which have no deleterious effect on the drug.

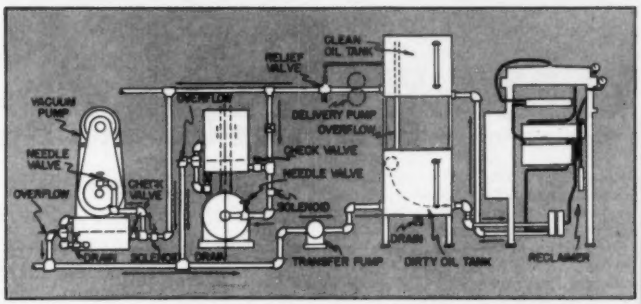
The final step in the process of producing streptomycin is the freezing of the liquid antibiotic into solid form. This was found necessary to prevent the streptomycin from foaming over the containers in which it is held when placed in vacuum ovens for dehydration which resulted in the loss of some of the drug.

Freezing Process

The water vapors released by the frozen streptomycin in the vacuum ovens are drawn through conductors into condenser coils and snap-frozen. This snap-freezing of the exhaust vapors reduces the volume of air that the vacuum pumps must draw out and makes possible the use of smaller volume pumps. When dehydration of the streptomycin solution has been completed, the dried antibiotic which remains in the vacuum ovens is removed, a new charge of frozen streptomycin is inserted and the complete process is repeated.

The keystone of the entire dehydration process is the group of vacuum pumps which maintains the vacuum in the dehydration ovens, draws excess vapors into the condensers and exhausts to the atmosphere such gases as are not snap-frozen in these condensers. In turn, the keystone of the efficient operation of the pumps is the oil seal between the rotor and cylinder and at the discharge valve.

In the original pilot plant set up at the New Brunswick plant, engineers found it impossible to maintain a steady rate of production because of the progressive contamination of the oil in the pump with moisture. Thus, over a 2 to 3 hour period pump efficiency would drop appreciably, culminating in a 15 to 30 min shutdown while the oil was changed. With a fresh charge of dry oil, pump efficiency was again at a peak, only to drop slowly until, after another two to three hours, the processing again had to be stopped and the oil changed.



This diagram shows how the lubricating oil is pumped from the pumps into the dirty oil tank. From here it passes through the reclaimer and is then pumped to a clean oil storage tank. From this second tank the reclaimed oil flows by gravity back to the vacuum pumps. A continuous supply of clean oil is available

When output of streptomycin was expanded from the pilot plant stage to full commercial production with the installation of a group of rotary vacuum pumps and the necessary vacuum ovens and condensers, company technicians added a Hilliard oil reclaimer for the continuous purification of the vacuum pump oil to insure sustained peak production.

The reclaimer, with a capacity of 50 gal per hour, removes both solid impurities such as carbon, sludge and abrasives and, what is most important in an installation of this kind, moisture and other high vapor contaminants. In this unit, dirty oil is first filtered through a bed of Fuller's earth or absorbent clay, then subjected to the drying action of an electrically-heated vaporizer and vacuum pump.

In actual operation, the lubricating oil is pumped from the pumps into a dirty oil tank. From there it passes through the reclaimer and is then pumped to a clean oil storage tank. From this tank the reclaimed oil flows by gravity back to the vacuum pumps.

Pump Life Prolonged

The continuous supply of clean oil has not only eliminated production stoppages while oil is changed and permitted the pumps to consistently produce a high vacuum, but it is prolonging the life of the pumps and saving up to 98 per cent of the lubricating oil used. With operations on a 24-hour basis, the filter medium used in the reclaimer to process the sealing oil is checked every week and replaced only when conditions require it, a rare occurrence.

The dollar and cents value of the oil treatment system is evident from the marked effect it has had on the production rate of streptomycin. By eliminating the three 15 to 30 min oil-change shutdowns, averaging 23 min each, from each 8 hour shift, the company has been able to boost output approximately 15 per cent. Production has been further increased by the elimination of the progressive decline in vacuum pump efficiency between oil changes which tended to prolong the period required to dehydrate a charge of streptomycin solution.

Fire Chief is shown with some of the hose cart men who form part of a team. A team consists of a captain and 20 men

PLANT FIRE TEAM
Puts Fires Out in a Hurry

The plant fire team gets to the scene of a plant fire in a matter of seconds . . . Retired city fire chief was hired to take over job of organizing plant fire team . . . An actual fire is started occasionally to see how teams perform

By G. F. BOSCH, Plant Engineer, The General Tire & Rubber Co.

COMPANY management believes in the old adage: "An ounce of prevention is worth a pound of cure." With that in mind, Fire Prevention heads the top of the safety list.

It is management's obligation to society to assure safe working conditions for the employees. Disastrous industrial fires result not only in millions of dollars in property damage, but also loss of work for the employees as well as the cost of replacement in man hours and materials.

Fire prevention is a part of accident prevention. A serious fire may shut down an entire department for a certain length of time. This is usually followed by a slow pick-up. All in all, it is difficult to compute the direct monetary cost of a fire.

Safe work and efficient production go hand in hand. With this thought in mind, the company set up a Plant Fire Team, made up of the employees, to handle such emergencies.

This team is, of course, in addition to the usual plant fire protection set-up. The set-up normally consists of sprinkler systems, departmental fire stations, and outside hose houses at each hydrant.

The Plant Fire Team is of vital and primary importance because of the following reasons:

1. In case of fire, the team immediately answers the call and takes over the fire fighting duties until the local Fire Department arrives on the scene. This saves valuable seconds of time which are so costly.

2. Upon the arrival of the local Fire Department, the team turns the job over to the firemen and works with them. The team assists them and performs whatever duties are required.

3. Since the welfare of a plant depends upon the cooperation and loyal support of its employees, membership on the Plant Fire Team makes the employee feel that he is a spoke in that great wheel known as Plant Operations. The employees thus participating on the team are alert to the hazards which lead to loss of production and loss of pay.

Fire Team Organization

The Plant Fire Team is headed by a Fire Chief. This person plays a very important role in the proper functioning of the team and, therefore, must be selected with care. It must be an individual who knows and understands people, but it must also be an individual who has had the proper training, the background —in short, the know-how.

For that purpose the company hired a retired city Fire Chief. As a secondary qualification, this individual has the knowledge of all city ordinances, local, state, and national codes.

It is the Chief's responsibility to maintain all the plant fire fighting equipment. It is his duty to make daily routine checks throughout the entire plant and submit to the Safety Committee reports of inspections and recommendations.

It is his job to train the men on the fire team and to familiarize them with the location of the fire fighting equipment and to teach them the proper use of the equipment. It is up to the Chief to refill all empty extinguishers and, for that purpose, a special space has been set aside in the plant. There he has a laboratory sink, a work bench, and a cupboard where he keeps his tools, spare parts, and chemicals.

Under the fire chief, in the organization chart, is an assistant, and under the assistant a team captain for each of the two teams. Each team consists of 20 men.

Each member, when joining the team, is taken on a tour of the plant by the Chief. There he gets a general bird's eye view of the various fire areas. Also, such areas which must be handled with extra care. He is shown the location of all the hydrants and P.I.V. posts, and the plant auxiliary fire boxes. He is required to memorize the plant fire code.

Fire alarms are sounded by sirens, autocall, red lights and electric horns, depending, of course, on the noise level which has to be overcome in a particular working area. Ten rings signifies a fire. The number

following the first 10 rings gives the location of the fire, i.e., 10 rings followed by 5 rings means that there is a fire in the west end tube room. The master box is connected with the city Fire Department and gives the alarm there directly.

Fire Stations

Aside from the sprinkler system and the fire cart stations, there are also the fire extinguisher stations. Three kinds are used: (a) the foam type, (b) the carbon tetrachloride type, and (c) the water acid type. The extinguishers are mounted on posts within the reach of any worker. All fire stations throughout the plant are designated by a red light and by a sign painted red and yellow.

The workers in each department have been instructed as to which type to use according to the type of fire whether it is electrical or other. The extinguishers, as a rule, are located every 100 ft. Every precaution is taken to eliminate guess work, and thus, save valuable seconds.

On the production floor, safety dispensers are used for chemicals. Also, safety cans are used for naphtha. All tables and machinery are properly grounded, and the buildings are well ventilated.

As indicated on the fire map, the plant is divided into strategic areas. These are primarily determined by the sprinkler piping arrangement from the main valves. Also indicated on the fire map, the plant is surrounded by hydrants, each located in a hose house.

Each hose house contains the following equipment: A spanner wrench; 100 ft of hose, one end connected to the hydrant; a kerosene lantern; an axe; a crowbar; and a nozzle.

Markings alongside each post-indicator valve indicate its particular fire area

All the roofs are inter-connected with steel catwalks and are made accessible by steel ladders, strategically located.

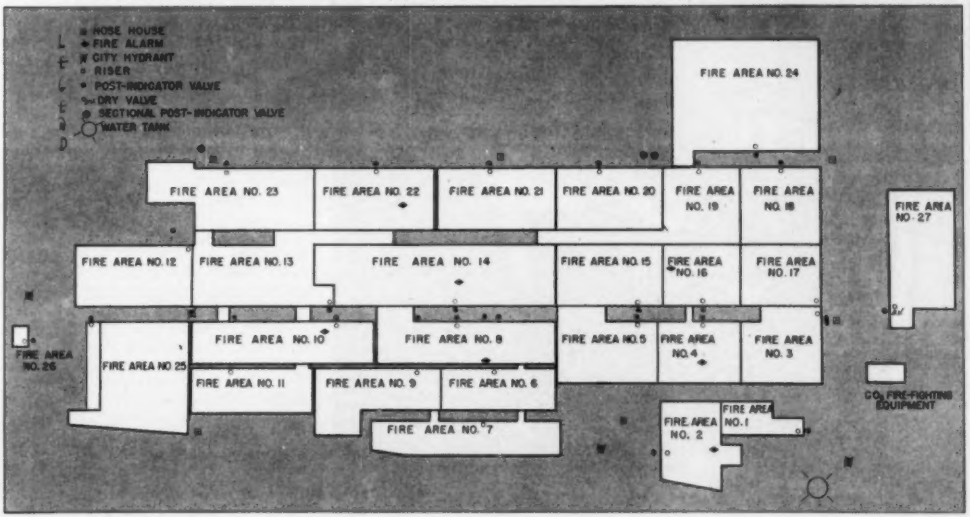
Water Reserve

One item in which we take pride is the fact that, besides a 110,000 gal water tower, we have also a 150,000 gal underground reservoir. This unit is located outside the plant and is operated by a 1,000 gpm fire pump with its own separate and independent sub-station.

In case of fire, should the water level in the elevated storage tank drop down to a certain level, it automatically kicks in the underground reservoir so that the sprinkler system will never run dry. Now, while the reservoir is in operation, the tower is being replenished. This is a very efficient operation, and its operation is controlled by a series of signal lights at the main plant guard station.

In all the company safety meetings, we do stress to supervision the importance of good housekeeping. The departments are kept clean and free of hazards. Many times a trifling hazard has caused a major fire. Supervision is instructed not to block doors, block the access to

Fire map shows division of plant into strategic areas determined by the sprinkler piping arrangement from the main valves



sprinkler system, extinguishers, and aisles, and to remove all trash. Smoking is only permitted in certain areas. Fire prevention is the responsibility of supervision.

In order to keep the fire teams alert and efficient in the handling of their equipment, the Fire Chief conducts a fire drill twice a week, one in the morning and one in the late afternoon or even at night.

Fire Drills

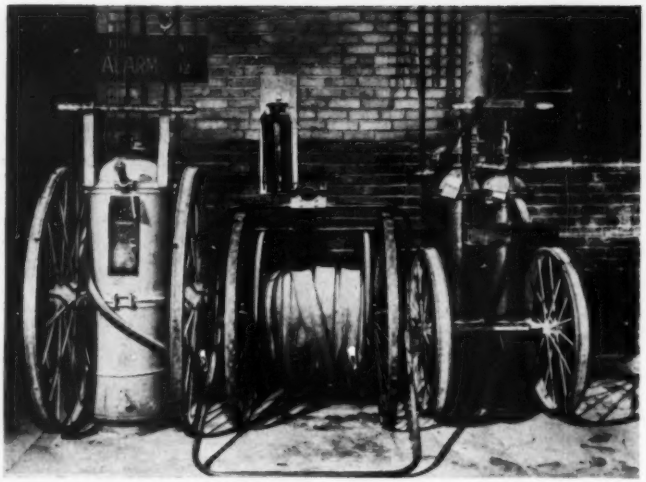
The Chief will also hold special demonstrations outside in the plant yard. These take place twice a year and, also, when new members join the team. The Chief will build a fire and teach his men the proper use and the proper handling of the hose nozzle. The fire may be of paper, sawdust, oily rags, rubber scrap, buckets filled with naphtha, fuel oil, acetone, or rubber cement, in order to show his crew the proper use of the different types of fire extinguishers.

Instruction is also given on the proper care, storage and disposition of flammable liquids and on the proper use of the industrial type of gas mask and how to use a blanket in case a person is on fire.

The element of surprise is what counts and keeps a team on their toes. Therefore, they never know which day of the week or time the drill will take place, nor whether it is a drill or the real thing. At a predetermined time, the Chief will make the necessary arrangements with the local Fire Department (that is to avoid their answering a false alarm). When everything is all set, he will post himself somewhere in the plant and sound the alarm. He clocks the team to find out how fast they answered the call. Occasionally, he will start an actual fire to see how well the team performs.

Each member of the team receives a dollar from the company for each drill answered. The assistant chief keeps a record of members present and absent.

Each year management holds a special dinner with all the trimmings for the Plant Fire Team. At such an occasion, remarks are made by the Works Manager, the Fire Chief and the members are entertained by a guest speaker.



Here is one of the many fire stations located throughout the plant. Each station is easily identified by a red light and by a sign painted red and yellow

Fire Chief checks equipment in one of the hose houses. Each hose house contains: spanner wrench, 100 ft of hose, kerosene lantern, axe, crowbar and nozzle

Defense Production Pools

ADDITIONAL defense production pools have been approved by the Defense Production Administration for handling defense contracts and subcontracts.

One is the Metal Products Co. Production Pool, of Nashville, Tenn. This pool is equipped to do defense work concerned with electronics, radio and electronic cabinets, machine shop items, certain aircraft components, metal forming, and boats and barges.

Others are: Consolidated Industries Defense Production Pool, Inc., of New York City. This pool can do foundry work, metal fabricating, welding, plating and finishing, and produce woodworking machine shop products, precision instruments, and electronic, photographic and communications equipment.

Woodworking Defense Production Pool of New York is equipped to make woodworking and allied products, including such items as storage bins, drawing boards, ammunition boxes, blueprint filing cabinets, etc.

Practical Materials Handling Ideas Result in Savings in Time and Effort

In handling a quantity of building materials, this lumber company tackles the job with practical handling ideas . . . Material is palletized to conform with fork-lift capacity and size of average order . . . In this way, speedy delivery with minimum of handling is accomplished . . . Result: materials are handled in less time and with less effort

FEW PLANT ENGINEERS have occasion to handle the quantity of building materials machine-muscled through the Bear Lumber Co. warehouse, Montgomery, Alabama. But, for those who have, this company has developed some practical ideas.

Included within the main warehouse is a railroad siding slashing through the concrete floor, flush with the box car openings. It is nothing for the personnel to talk of moving 32,000 face brick in half a day with one straddle truck and speak in terms of 2½ million brick for one job and 120 thousand face brick for another.

A mountain of material is moved daily with a straddle truck and two fork-lifts—one large, one small.

Every basic building material except millwork is palletized. Speedy delivery and a minimum of handling are the twin aims of this operation which balances truck and fork-lift capacity against size of average order to determine number of pieces to packaged unit.

Cement, for example, is often ordered by the ton and stocked 20 bags to a pallet. A ton is the capacity of the smaller fork-lift. Plywood is stacked 25 sheets to a pallet as orders are generally for 25, 50 or 100 pieces. On the other hand, 2 by 4 and other standard construction lumber is bundled as it comes out of the car to suit the job, if possible; otherwise it is packaged in various amounts and marked, so that a package nearest to the number of pieces can be loaded. In this way, dump trucks can drop banded lumber in stacks on the building site.

The company has designed pallets that can handle 4180 bricks on a straddle or lift truck. The pallet is usually stacked with 4000 bricks as this is the capacity load of a dump truck with a 12-ft body—also 4000 bricks is a usual unit for ordering.

Ideas That Simplified Job

By palletizing the building materials according to unit order and by keeping the loads within the capacity of the handling equipment—a straddle truck and two fork-lift trucks—this lumber company is able to move materials more efficiently.

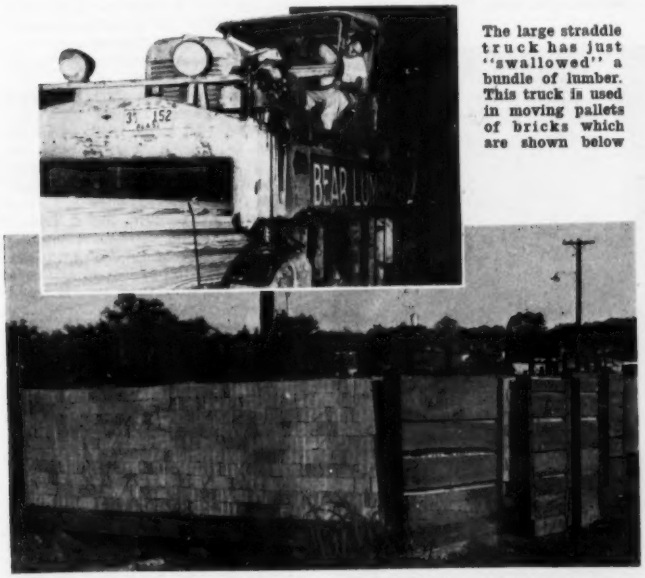
When the brick is a local product, the straddle truck places the empty pallets beside the kiln at the brick yard, to receive the bricks as they come from the kiln. The straddle truck then picks up the loaded pallet and delivers it to the job site or to storage yard. The 4000 bricks on a pallet are never handled manually from the time they leave the kiln until they are being laid on the job. A straddle truck can handle (deliver) 32,000 bricks in half a day; whereas it would take two dump trucks two days to do the same job.

In the case of a carload shipment of bricks, two or three men unload them onto the pallets. After they are palletized the straddle truck can move the pallets to the job site or to a spot on the storage yard. If the bricks were not palletized, the unloading operation would tie up a couple of truckers.

A similar savings is made in the unloading of lumber from box cars. The lumber is stacked on pallets, sized, graded and counted as stacked; then banded and handled by lift-truck to proper bin storage, or to job.

At present twenty men are employed in the warehouse as truck drivers, unloaders, stackers. etc. Equipment includes: four dump trucks; one flat bed truck; one truck and trailer for handling structural steel (although structural steel is also unloaded by fork-lift and delivered by straddle truck) and one pick-up truck.

Without the assistance of this materials handling equipment, the company feels they would need 30 more men and additional trucks to handle their present volume.



The large straddle truck has just "swallowed" a bundle of lumber. This truck is used in moving pallets of bricks which are shown below

Face brick is palletized 4000 to a unit on specially designed pallets and readied for straddle truck delivery. This amount, 4000 bricks, is the usual ordering unit

OUTPUT DOUBLED!
--Just by Heating the Plumbing

Four space heaters, streamlined ductwork system, air exhaust fans, help control humidity conditions and evaporate 700 lb of water per hour . . . Heater rooms erected against outside of building to conserve in-plant space and return air passed through concrete block tunnel outside plant . . . Fuel economy reported high

INCREASED PRODUCTION capacity for castings of vitreous china plumbing ware has been attributed to a new heating and ventilating system installed at the Robinson, Illinois Pottery of W. A. Case & Son Manufacturing Company. By installing this new system, plant management was able to decrease drying time for castings and molds, making it possible to add a second eight-hour production shift. With the addition of this second shift, the company has doubled the plant output.

The new heating and ventilating system is based on the use of four direct-fired space heaters, coupled with an efficient, streamlined ductwork system to carry warm air to all areas of the casting shop. Air exhaust fans, located in the roof, help control humidity conditions, and to exhaust powder-laden air caused by powdering the molds before casting. The casting shop is an L-shaped brick structure, 570 ft long and varying from 121 ft wide at one end to 96 ft wide at the other. It has a total floor area of 58,515 sq ft. The roof is 17 ft high at the center and slopes to 12 ft at the outer walls. The floor of the casting shop is of concrete.

In the casting process, clay in semi-liquid state, known as "slip," is piped to casting benches where it is poured into plaster molds. After the pieces of ware have dried enough to retain the shape of the molds, they are removed and stored on racks for further drying. At the same time molds are dried separately and then powdered in order to be used again.

Constant circulation of warm air in large volumes is required to reduce the moisture content of fresh castings at speeds conducive to production efficiency without harming the quality of the product. This calls for an inside air temperature of 85 to 90 F, even when the outside temperature drops to as low as 10 F.

The basic heat load of the casting shop, considering its size and type of construction, is estimated at 4,096,000 Btu an hour. However, the heating system must evaporate as much as 20 per cent of the water content in the slip. This is equivalent to about 60 barrels of water a day, or 700 lb of water an hour. This process drying heat load amounts to 1,950,000 Btu per hour which results in a total heat load of approximately 6,046,000 Btu per hour for the casting shop.

Previously, the casting shop was supplied with waste heat from nearby firing kilns. This was supplemented by small oil-fired, floor type space heaters. The total heat supplied from these sources was insufficient for the drying operation and air distribution was inadequate. Furthermore, lack of proper air circulation caused discomfort at times among the employees.

To conserve space in the casting shop, two heater rooms, each approximately 35 ft by 16 ft and 12½ ft high, fabricated of iron panels on steel piping, were erected against the outside of the building. Each heater room contains two Dravo heaters, capable of supplying 1,500,000 Btu per hour apiece. Designed for normal operation with gas, the heaters are equipped with conversion burners so that oil can be used in case of a gas shortage.

To achieve proper air distribution through the long runs of ductwork, a 40-hp double inlet fan, with V-belt drive, is used in each heater room in addition to the heater fans. The fans, 66 in. by 46.2 in. with a motor speed of 1150 rpm and a fan speed of 380 rpm, each supply 67,500 cu ft of air per minute. Each heater fan handles approximately 17,000 cu ft of air per minute. Two banks of 1-inch filters are used to filter the air as it enters each of the heater rooms.

There are two separate duct systems, one for the east end of the casting shop and the other for the

Workman adjusts manual damper control on one of the downcomer hoods which are installed at individual work stations. Air discharges from bottom of hood and is deflected slightly upward by adjustable baffle to flow over castings and molds

west end. The main air supply duct for each duct system is 80 in. by 40 in., tapering down in size as it feeds two branch mains running overhead the length of the casting shop. From the branch mains, downcomers 12 in. in diameter drop to each casting work bench. A manually controlled damper is in each downcomer, enabling the operator doing the casting to regulate the volume of air desired.

Most of the downcomers are fitted with 18-in. by 6-in. hoods of 18-gauge sheet metal. The hoods are 6 ft in length and extend down to within 18 in. of the floor line. A small vertically sliding baffle plate fitted at the bottom of the hood is adjustable to provide an opening of from 2 to 5 in. Each baffle plate, which is 8 in. wide, is upturned slightly to direct air flow upwards. With this arrangement, air can be discharged exactly at the proper angle to flow over the pieces to be dried on individual racks.

Static pressure drop in the new ductwork system is negligible because branchings are streamline fittings with wide radius elbows, and the branchings are properly portioned to divert flow with a minimum pressure loss.

An important feature of this system is that sufficient heated air is provided for the drying and comfort heating job without creating undue turbulence that stirs up dust. Dust movement must be kept to a minimum for health reasons.

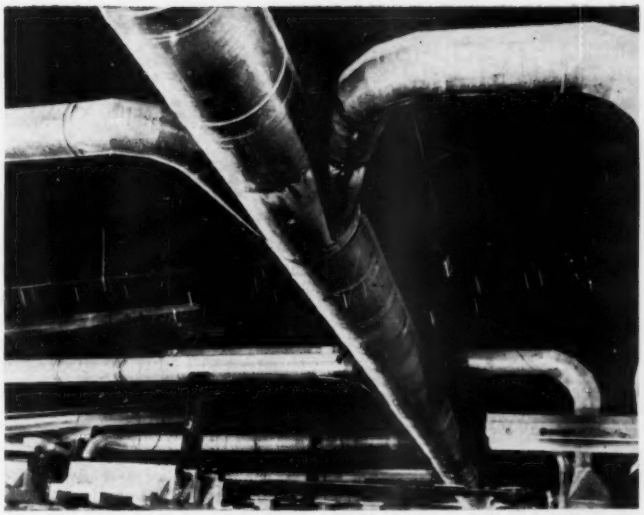
The heaters are operated 24 hr a day, seven days a week, with a minimum of maintenance required. Modulating controls regulate the heaters automatically while air flow remains constant, insuring the correct amount of heat and air volumes.

The stainless steel combustion chamber eliminates the need for a refractory lining, and thus increases the efficiency of heat transfer to the air surrounding the outside of the combustion chamber. Heat transfer from flame to air through the stainless steel walls is virtually instantaneous, causing a rapid build-up of desired temperature. Moreover, stainless steel is resistant to corrosion caused by continuous high temperatures or by the constant flow of moisture-laden air over the surface of the combustion chamber.

To conserve fuel and achieve a high degree of operating economy with this system, air is returned to the heater houses by means of return air chambers built of concrete blocks. These return air chambers extend some 90 ft on each side of the two heater houses and are built against the exterior brick wall of the casting shop. The chambers are approximately 3 ft high at the far end and slope upwards to 4 ft high where they join the heater house. They are 4 ft wide inside at the far end and widen to an opening of 10 ft where they join the heater house. Here, the two banks of filters are installed. Return air is discharged directly into the heater house, and drawn into the base of the heaters. Air from the shop enters the return passageway through wall inlets at floor level. These inlets are 2 ft wide and 1 ft high.

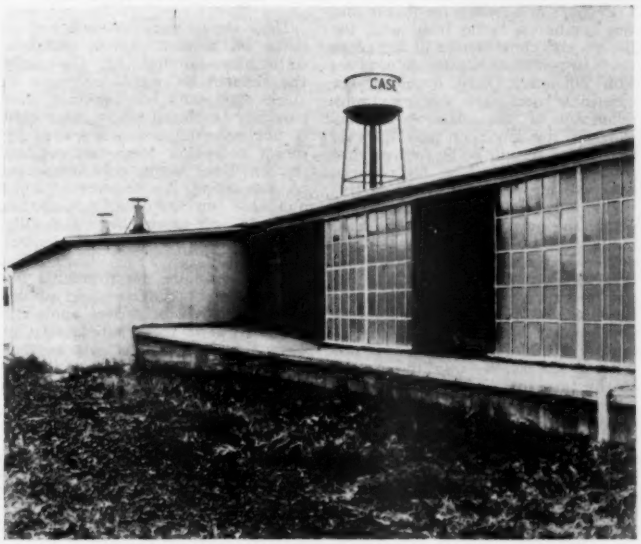
Provisions also are made to blend fresh outside air with the return air. This replaces the air exhausted by roof fans of the casting shop and prevents a build-up of negative air pressure in the building due to the removal of large volumes of air.

J. L. Henderson, Jr., design engineer of the Robinson Ventilating Company, Zelienople, Pennsylvania, designed this heating and ventilating system, including the layout for the ductwork. Installation of the entire heating system was handled by Young & Bertke Company, sheet metal engineers, Cincinnati, Ohio. Heaters are by Dravo Corp., Pittsburgh.



Close-up photograph showing how the branch ducts for downcomers are taken off in "Y" connections. Static pressure drop is negligible with new ductwork

Building at right houses four heaters which supply the warm air for china pottery. Return air from the shop flows through tunnel running beneath window



Solving Problems in LIGHTING of PLANT OFFICES

Do you know what fixtures to use in order to achieve desired effects? Step-by-step procedure in developing proper lighting installations for plant offices. . . Estimating the maintenance factor. . . Determining the economics of a selected system of lighting. . . Evaluating the merits of fluorescent and incandescent lighting. . . Installation data

By J. G. HOWELL, JR., Electrical Engineer

EVERYONE KNOWS the importance of lighting. As children we learned and proved to our satisfaction 1—that the best seeing and reading light was one that came over our left shoulder; 2—that for eye comfort the paper should not be so glossy as to reflect too much light back to our eyes; and 3—that to avoid eye strain the light source should be shaded from the field of normal vision.

As the types of our light sources improve so should our knowledge and ability to apply them. Unfortunately this has not always been the case. While today there are many good lighting installations, ones that fulfill the simple requirements of eye comfort, there are many poor lighting installations even in the offices of otherwise modern plants.

Perhaps one reason for this is that the engineers, being busy with the design and construction of the plant itself to assure its maximum production efficiency, may overlook the essentials necessary for maximum efficiency of the office personnel. Perhaps the engineer may indicate that there should be 50 foot candles of illumination but in his concern over other matters the lighting fixtures may be bought strictly on price: the most lumens for the least money.

This emphasis on the quantity of lighting without reference to its quality can result in an unsatisfactory installation. Quality in lighting costs money and few fixture manufacturers will quote on their better fixtures unless the quality as well as the quantity of the lighting has been clearly established by specifications as to style and type of fixture.

The seeing tasks of management personnel are generally quite moderate. Knowing this lighting engineers will often use in an executive office a type of lighting fixture that has a high architectural appeal but low quality light output. Thus it happens that management may not always be aware of the degrees of lighting quality unless it is especially informed on this subject.

On the other hand, good lighting is most important to the efficiency of accountants, stenographers and other operators of business machines for the prime job of these people is using their eyes. Yet too often one finds these people working under lighting installations that fall well below the standards which are necessary for good working efficiency and comfort. If it is suggested that the lighting is at fault, a solution may be sought in providing desk lamps for the obvious sufferers of eye fatigue.

Light Quality Important

Desk lamps vary in style and in price, but seldom provide adequate or comfortable lighting. Obviously they cannot be readily arranged to shine over one's left shoulder. Nor can they be placed where some light is not reflected into one's eyes by direct reflection from the reading matter. Desk lamps only temporize by increasing the amount of light available on the reading matter. They do little to improve the quality of the lighting and more often effect it adversely.

In meeting the requirements for good lighting today, instead of directing a single light over one's left shoulder, it is more satisfactory to have a well lighted ceiling so that the light is received from many angles overhead. However, we still insist, as before, that light glare should not be reflected to the eyes from the reading matter or from any objects at desk level. We also insist that the light be so arranged that the eyes at no time can see the source, either directly or by reflection.

How do we go about developing such a lighting installation for today's plant offices?

1. *Our first step is to establish the desired level of illumination.*

Plant general offices may be satisfactorily illuminated at 30 foot candles; however, for work involving detail higher illumination levels are desirable. For moderate detail work 40 to 50 foot candles are considered reasonable minimums, while for work having considerable detail, 70 foot candles and higher should be provided.

High level illumination installations are of great satisfaction to the designer as well as to the occupants. Such installations can make all other spaces not similarly lighted appear dingy and inferior by comparison.

2. *The next step is to select the type of illumination system to be used.*

That is, whether it is to be of the direct, semi-direct, general diffuse, direct-indirect, semi-indirect or of the fully indirect type. In general the quality of light improves and the cost increases in the order given for the above types. With the direct type of lighting all light is directed downward and there is no illumination of the ceiling.

Some ceiling illumination is produced by the semi-direct type, and a maximum of ceiling illumination is produced by the indirect type. If a flush type of acoustical ceiling is to be installed it will be advantageous to use the semi-indirect or fully indirect type of lighting. If the ceiling will be left unfurred it will be advisable to use the semi-direct type or general diffuse type of lighting.

3. *The third step is to select the style of lighting fixtures preferred and to determine whether they are to be recessed, ceiling-mounted, or suspended.*

For office lighting in a modern plant it is preferable that there be a diffuser of plastic or glass between

Comparison of Office Lighting Fixtures

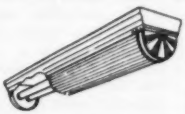
TYPE OF FIXTURE	TYPICAL FIXTURE	TYPICAL LIGHT DISTRIBUTION		REMARKS
① DIRECT			↑ 5 ↓ 55	**RLM Reflector with Diffuser** High Surface Brightness. Best used in isolated locations of infrequent use. Very low installed cost.
② DIRECT			↑ 0 ↓ 50	**Recessed or Troffer Type** Diffuser flush with or convex to ceiling. Excellent for executive offices where high brightness is unimportant. Installed cost high.
③ SEMI-DIRECT			↑ 9 ↓ 55	**Ceiling Mounted** Diffuser enclosed. Partial ceiling illumination. Suitable for hallways. Also for general offices if mounted close together. Low cost.
④ SEMI-DIRECT			↑ 20 ↓ 47	**Ceiling Mounted** Diffusers on sides and bottom. Effectiveness of ceiling illumination varies with design and length of brackets. Moderate cost.
⑤ GENERAL DIFFUSE			↑ 39 ↓ 45	**Suspended from Ceiling.** Uniform light distribution. High surface brightness with high wattage lamps objectionable in low ceiling offices. Low installed cost.
⑥ DIRECT INDIRECT			↑ 49 ↓ 33	**Suspended from Ceiling** Diffusers on sides and bottom. Good lighting quality and moderate cost for general office use.
⑦ SEMI-INDIRECT			↑ 56 ↓ 20	**Suspended from Ceiling** Diffuser reflects more light upward than is diffused downward. Good lighting quality. Moderately high cost.
⑧ INDIRECT			↑ 79 ↓ 3	**Suspended from Ceiling** Semi-translucent reflector. Most of light directed upward. Excellent lighting quality with low cost. Heat output a problem.
⑨ INDIRECT			↑ 80 ↓ 2	**Suspended from Ceiling** Semi-translucent reflector. Excellent lighting quality for general offices. Installed cost high.

Photo: Westinghouse Electric Corp.

Good example of well-lighted office. Note the almost complete absence of shadow, even under chairs in foreground. Ultraviolet sun lamps are added refinement

the light and the working level. This is important since light sources in use today have too great a surface brightness to be viewed directly by the eye even by accidental reflection from some object on the desk or from the bright metal parts of a tabulator or typewriter. This requirement eliminates fixtures that have louvered bottoms or sides.

While a louvered bottom type of fixture might have an advantage in that it requires less frequent cleaning it will be found that the objections to the specular reflection of the bare lamp surface from the bright metal parts of a business machine will be greater than any advantage of easier cleaning.

Louvered fixtures may be selectively used in small offices and halls where there it is definitely known that there will never be a problem of accidental reflection from bright metal parts. Otherwise their practical use is rather limited as far as general office applications are concerned.

Thus for quality, lighting fixtures fitted with diffusers are the preferred type. The brightness of the diffuser will vary with the type of lighting system. With indirect lighting the diffusers should have about the same degree of surface brightness as the ceiling. Thus the fixture and ceiling blend together and the eye does not have to continually readjust itself for varying degrees of brightness of the fixture, the ceiling, the wall.

For the semi-direct and semi-indirect types of lighting which direct a good portion of the light downward the diffusers must have sufficient area to hold the surface brightness to a reasonable minimum. As the lumen output of the fixture is increased so must the area of the diffuser be increased.

Indirect fixtures which have opaque reflectors should be used with care. If the outer finish is not light enough, or receives an insufficient amount of light from the walls and floor, it will appear as an objectionable dark blob hanging from a brilliantly lighted ceiling.

Semi-direct fixtures are generally ceiling mounted while the semi-indirect and the indirect types are suspended from the ceiling. Indirect lighting may also be obtained by housing the lamps in coves in the walls or columns.

Recessed lighting fixtures called "troffers" have a high architectural appeal in that they are installed flush with the ceiling and the fixtures are thus less conspicuous. Troffers give direct lighting only. The ceiling is lighted only by reflection of the light from the floor and walls. Unless these are very light the ceiling will appear objectionably dark and as such the lighting will not be suitable for general office work, although troffers may be used quite successfully in executive offices.

4. *Having narrowed the selection of fixtures under consideration to a few styles and types the next step is to determine the utilization coefficients for the fixtures in question. For most fixtures this data are available in tabular form from the fixture manufacturers. Approximate data for the commonly used styles and types are also given in the general literature on lighting.*

The utilization coefficients represent that fraction of the lamps' total available lumens that actually reach the desk level. Every reflecting and diffusing surface absorbs some of the light. Walls generally have greater absorption than a ceiling.

Wall Area a Factor

Since a small room will have a greater ratio of wall area to ceiling area as compared to a large room the small room will have the lower utilization coefficient since there is proportionately more wall area to absorb light. Thus the utilization coefficients take into account the amount of light absorbed by the fixture, ceiling and walls and is in addition governed by the size of the room as well as the mounting height of the fixture.

For an office of moderate size, which has walls and ceilings finished to provide reasonably good reflection, the utilization coefficients for the various types of lighting fixtures that might be used are given in the following table:

	Semi-direct	Semi-indirect	Indirect
Minimum	0.21	0.18	0.15
Maximum	0.68	0.56	0.45

From this table it is apparent that for the better types of lighting systems, less than ½ of the lumens from the lamps will actually reach the working level.

5. *The next problem is to estimate the maintenance factor.*

This factor takes into account the gradual loss of lumen output from a lamp as it blackens on the inside, the longer it is in service. It also considers the rate of build up of dirt on the diffusers and reflecting surfaces of the fixtures as well as on the lamps, walls and ceiling. This build up can only be minimized by regular maintenance. If the maintenance is expected to be good the maintenance factor will range from 0.60 to 0.75 for the types of fixtures that might be used in an office. If the maintenance will be a problem, a factor of from 0.40 to 0.50 may be required.

6. *Having thus established the utilization coefficients and maintenance factors the next step is to determine the number of fixtures that will be required to obtain the desired level of illumination at desk height.*

This is done by using the following formula:

$$\text{Number fixtures} = \frac{\text{FC} \times \text{Area}}{\text{UC} \times \text{MF} \times \text{LN}}$$

where—FC equals the desired foot candles at desk level.

Area—floor area, square feet.

UC—the Utilization Co-efficient.
MF—the Maintenance Factor.
L—the number of Lumens per lamp.
N—the number of lamps per fixture.

7. *At this point it may be desirable to determine the economics of the major types of lighting systems that are under consideration. Setting the various values down in tabular form will be helpful in making this study.*

Such a form might have the following headings: A. Name of fixture; B. Type of lighting; C. Style of fixture; D. Number of lamps per fixture; E. Lumens per lamp (Initial); F. Utilization coefficient for the fixture and office; G. Maintenance factor for the fixture and office; H. Number of fixtures required; I. Cost per fixture installed with lamps; J. Total cost of installation; K. Watts per fixture; L. Total watts per year; M. Cost of power per year; N. Average life of lamp; O. Cost of lamps including labor cost of changing; P. Annual cost of replacing burned out lamps; Q. Total annual cost of power and new lamps.

From such a study it is also possible to evaluate the merits of incandescent vs. fluorescent lights and standard fluorescent vs. slimline fluorescent. If consideration is being given to incandescent lights their greater heat output and their need for larger power circuits must also be taken into account.

Consider Heat Output

The greater heat output may play havoc with the air conditioning system in the summer time while the greater power load will require larger lighting transformers, wiring and panel boards. Fixtures using incandescent type lamps are the most economical where the cost of power is low and/or the hours of usage are low. While many look on the fluorescent fixture as the more modern type, a good lighting job can still be done with the incandescent style of fixture.

The slimline is the most modern of the fluorescents but will often be found to cost more to install and maintain than the standard 48" fluorescent fixture.

8. *Having narrowed the selection down to 2 or 3 styles of fixtures by the above analysis the next step is to determine the location and method of mounting the fixtures.*

The general layout and the nature of the various office spaces, the location of the desk, chairs and tables, and the location of the aisles, hallways and other low lighting level areas should be determined and lightly outlined on a drawing. The fixtures should be laid out as symmetrically as practicable in each bay.

Work areas will require higher levels of illumination than hallways and aisles, hence some modification of the symmetry must be made for economy to avoid unnecessarily overlighting non-working areas.

Fluorescent fixtures should be installed parallel to the normal line of sight as this is the direction in which the eye actually sees less of the bright surfaces of the fixtures. Fluorescent fixtures that are individually suspended are readily twisted out of line whenever a tube is changed; whereas when 2 or more are joined together end to end, they are not as likely to lose their alignment. Also fewer wiring outlets are required when fixtures are installed in multiple and the actual job of wiring is much simpler.

Permissible mounting heights and spacings between fixtures are usually listed by the manufacturer for each type of fixture. The higher the fixture can be mounted, the more uniform will be the distribution of light that is directed on the working plane below. However, if the fixtures are too close to the ceiling, illumination of the ceiling will not be uniform and objectionable dark areas may be left between fixtures.

For an office with a high ceiling it is possible to hang the fixtures well down from the ceiling and thus minimize the dark areas. In offices with low ceilings, fixtures that are suspended too low present a psychological problem as one becomes increasingly conscious of the fixtures as overhead objects perilously close to one's head. They also appear as annoying bright spots too prominent in the normal line of vision.

Thus, in offices having ceiling heights of 10 ft or less a compromise must be reached between the normal requirements of good light distribution and the psychological reaction to the light fixtures as objects. As many fixtures are furnished with suspension hanger stems having a standard length of 24 in. the hanger stems must invariably be shortened for use in offices with low ceilings.

Private or semi-enclosed offices require special treatment to avoid concentrating too much light in the center of the room. In moderately large private offices a pleasing effect is achieved by the installation of several fluorescent fixtures assembled in an "L" shape so that the light always comes from behind the individual's shoulder when facing toward the center of the room. Smaller private offices will require at least 2 fixtures—one on either side of the desk so as to avoid shadows.

9. *The final step in developing a satisfactorily lighted plant office is to establish the color and finish to be used on the walls, the ceiling, the floor and the office furniture.*

Wherever practicable the decor should be light. The ceiling should be egg shell or white with a high reflectivity—80 per cent or better. The walls should be almost white but lightly tinted—just enough to provide relief. The floor tile should be as light as practicable so as to reflect as much of the light as it can back to the ceiling for its further illumination. Dark greens and browns in floor coverings should be avoided in the interests of improved lighting.

Desks, tables, chairs and file cabinets should be finished in light satiny colors rather than in dark greens. Most office furniture manufacturers now finish their cabinets and desks in pleasing tones of grey, light green or tan and imitation wood colors. These finishes improve the office illumination in two ways—first, they reduce eye fatigue by minimizing the brightness contrast of the objects in the normal field of vision and secondly, they increase illumination by reflecting light.

"Did you hear that mating call?"

FIBROUS GLASS, TAPE, and CHEMICALS

Simple device developed for coating tape with plastic before wrapping around void cover (glass cloth with cured surface)

Applying coated fibrous glass tape, 1½ in. wide, over the cover. Expansion and contraction have been no problem

Above: Applying fibrous glass molding mat over finished job. Below: Wrapping the finished patch with Kraft paper

U. S. Navy Develops Simple, Fast Repair Method for Steam, Water, Air Piping

STEAM, OIL, GAS and air lines are the arteries of today's fighting ships. One broken line out of commission for an extended period can mean disaster in a naval engagement. So means for preventing such an occurrence were sought by the navy. At this writing, the problem of steam lines has yet to be investigated but such investigation is planned for the near future. The photos on this and the facing page show progress made thus far by the U. S. Navy and two cooperating industrial concerns: Owens-Corning Fiberglas Corporation and Cordo Chemical Corporation.

The U. S. Navy Damage Control Training Center developed the patch which consists of the following parts: a void cover, which is a fibrous glass cloth with cured resin surface; resin and activator; fibrous glass tape; fibrous glass mat; a device (see photo) for coating the tape with activated resin.

No Geniuses Required

Application is simple and provides a quick emergency method of repairing a wide variety of damage to pipes, flanges, elbows and connections. The patch can be applied in some cases where only a time-consuming permanent repair is now possible. In other cases it can be used where present methods would be hazardous or impossible.

Odd shapes and jagged protrusions in ruptured pipes are said to be no obstacle. Application of the patch under these conditions is limited only by working space and ingenuity.

Completely severed ends of pipe can be successfully joined and "sunflower" type bursts with jagged edges can be covered. Pressures up to 300 psi can be successfully handled; under ideal conditions pressures even higher than this can be taken care of.

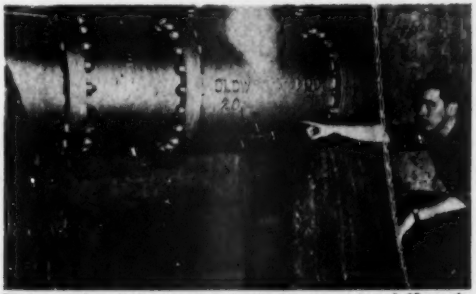
Investigations have shown that the cured patch is not affected by the gases or liquids found in shipboard lines with the exception of high temperature material. Temperature tests are now being prepared by the Boiler Test Laboratory, Naval Shipyard, Philadelphia.

Time of application is, of course, an important ingredient in shipboard (as well as industrial) repairs. It was found that a trained crew can apply a plastic patch in approximately 7 minutes on a straight pipe or an elbow; in about 14 minutes on a flange. Pressure may be applied to the repaired rupture about 20 minutes later.

It is possible to apply a series of 1, 2 or even 3 patches and have pressure back on the line in from 35 to 55 minutes. This time period depends on size or type of rupture, working conditions, temperature of the atmosphere.

MAKE EMERGENCY REPAIRS TO PIPE

Water Supply of Newark, Ohio, Saved With New Technique of Pipe Patching



Water gushes from two breaks in 20 in. main of Newark, Ohio, station. Direct supply was cut off, reservoir used

WITH ULTRA MODERN trimmings, the story about the little Dutch boy at the Dike was re-enacted in Newark, Ohio, recently. The story began to unfold in the municipal pumping station when a 20-in. water main broke in two places, threatening the water supply of Newark.

When the news reached the plant of Owens-Corning Fiberglas Corporation, a group of the company's technologists assembled to discuss possibilities of using a new experimental technique to mend the broken main. At this point, the reserve supply of 3½ million gallons in the reservoir on top of Horn's Hill was slowly dwindling.

In the meantime, Owens-Corning laboratory men, who have been working on an emergency repair kit with the Navy for just such repairs aboard ships during battle engagements, were mapping out plans with Dale Kleist, laboratory manager, and Harry Smith, head of laboratory engineering.

There were two breaks about ⅜ of an inch wide at each end of a 14-ft section of pipe. Welding experts said it would take at least 20 hours to make a doubtful mend.

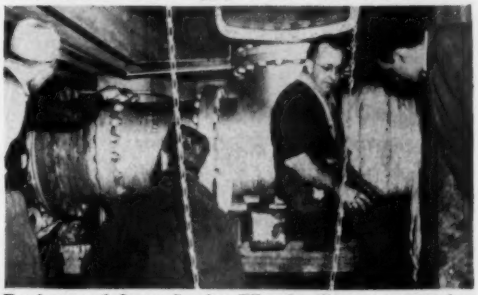
With the water supply in the reservoir now more than half gone, the dozen Owens-Corning men, armed with materials and equipment, descended into the pumping station pits. Splashing around ankle deep, the men actually began work on the repair at 9:30 PM and completed the job in less than three hours.

The emergency repair was effected by placing ⅛-in. thick rubber in 4-in. wide strips over the breaks. Then 3-in. wide steel bands were applied and tightened. Next used was layer on layer of Fiberglas reinforced pressure-sensitive tape a half inch wide and more Fiberglas woven tape four inches in width.

During the application, Ralph Sonneborn, an Owens-Corning development engineer, was mixing a solution of polyester type resin, China clay, peroxide catalyst and cobalt accelerator in paper cups and others were applying it on the tape. This fast hardening mixture required speed in handling as the tape set within minutes, making a firm plastic bond as it contracted during drying. Mr. Sonneborn said the China clay was used to give the solution body for easier handling and to make the repair non-porous.

Shortly after midnight the repair team stepped aside and watched as the valve was opened to the high pressure line.

Slowly the pressure mounted to full capacity without a single drip. So secure was the repair that the water department stepped up the pressure enough to supply the entire city at peak capacity and still pump enough water to refill the city's water reservoir on top of Horn's Hill.



Employees of Owens-Corning Fiberglas Corp. are wrapping pressure sensitive, woven glass tape around the broken main

Above: Will tape hold till permanent repairs are made? Below: Demonstration shows how hard the solution has set

Planned MATERIAL

By JOHN BODEN, Supt.,
Plant Layout Department,
Motor and Control Division,
Westinghouse Electric Corp.,
Buffalo, New York

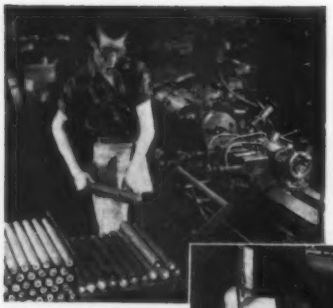


Fig. 1. Left: Shaft stock is placed in two-compartment buggy for easy movement from one job to another. Finished shafts are inspected and stored in shelf racks or temporarily in the buggies

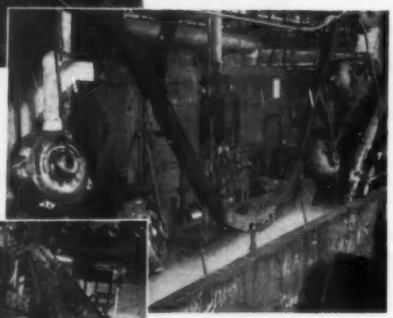


Fig. 2. Right: Hub and bracket are hooked to overhead enclosed rail conveyor and pass on to washer, primer dip vat and spray booth

Fig. 3. Left: After spraying, brackets roll from belt conveyor to gravity roller conveyor to boring machine

Fig. 4. Right: After boring operation, brackets are stacked on the pin type racks on truck. With these pin type racks each truck holds 300 brackets

Fig. 5. Left: Sheet steel for stator and rotor laminations are received in bundles and unloaded by traveling crane equipped with a sheet lifter

Fig. 6. Right: Containers of square sheets (at left of photo) are brought from storage by overhead crane to unloading rack where they are fed by hand to press

THE PRODUCTION of a motor involves many operations and when the quantity of output is large, the question of moving the materials from one process to another calls for a carefully planned mechanical handling layout if costs are to be kept at a minimum. The Buffalo plant of Westinghouse furnishes an excellent example of how this can be worked out. There are overhead cranes and conveyors, work level conveyors and underfloor conveyors, plus fork trucks, castered racks and frames, skids, pallets, hoists, all laid out so as to provide a well integrated, smoothly functioning system.

Rather than give a detailed description of all the handling equipment, some of the lines of manufacture of the more important parts and sub-assemblies have been selected for discussion. It should be borne in mind that the products are standard squirrel cage induction motors from 1 to 15 hp at 1800 rpm, and corresponding ratings at other speeds. The manufacturing space under consideration is approximately 250 ft wide by 750 ft long.

Receiving Parts

Steel axle shaft stock from 1¼ in. to 2¾ in. in diameter and 14 to 27 ft long is received in gondola cars. This is unloaded with a 3 ton floor-operated overhead traveling crane with a chain sling, which stores it in I-beam, pin type racks near the machining area. The stock, in sufficient quantity to cut from 6 to 20 shafts at one setting, is delivered by the crane to hack saws. As the shafts are cut they roll down a chute leading to a centering machine to be milled to length and centered.

They are then placed in two-compartment buggies, as seen in Fig. 1, which are used throughout this manufacturing section to move the shafts from one operation to the next. During the various operations the shafts are worked from one compartment to the other, which is very convenient from the standpoint of being sure that none are overlooked. After the shafts are finished

HANDLING
At Westinghouse

Article tells how motor parts are moved by mechanical handling equipment from the time the parts are received to final assembly

they are inspected and stored in standard shelf racks or temporarily in the buggies.

Drawn brackets or end bells and drawn hubs are received in railroad box cars at the machining area and are unloaded manually into steel tiering boxes. A fork truck is then used to handle the steel boxes in this area.

The boxes of hubs are delivered to the automatic welding machine for welding to the brackets, after which they are placed on hooks of overhead enclosed rail conveyor which takes them to a washer. From this point they travel on the same conveyor to the primer dip vat as seen in Fig. 2 and then continue, on the conveyor, 120 ft in 30 minutes, for drying, to the finish gray water-wash spray booth.

After spraying, the bracket is placed on a "call" belt conveyor which runs between the booth and a chucking lathe whose operator controls the movement of the conveyor. The brackets roll from the end of this belt conveyor onto a gravity roller conveyor where they are within easy reach of the lathe operator. This is shown in Fig. 3.

From this point the machined brackets travel over a gravity roller conveyor to the boring machine. This conveyor can hold 140 brackets. After the boring operation, the brackets are stacked on pin type racks on castered trucks, each truck holds about 300 brackets, as illustrated in Fig. 4.

The sheet steel used for stator and rotor laminations is received in gondola cars in bundles 36 in. wide, 72 in. long and 18 in. high, weighing 10,000 lb each. The cars are unloaded by a 15 ton cab-operated traveling crane equipped with a sheet lifter and bundles are stacked on the storage floor, see Fig. 5.

The same crane delivers the bundles of sheet from storage to a stripping conveyor which takes the material to a feeder where single sheets are picked up by suction cups and placed on an aligning conveyor. From the latter, the sheets are fed through a series of rolls and cutters

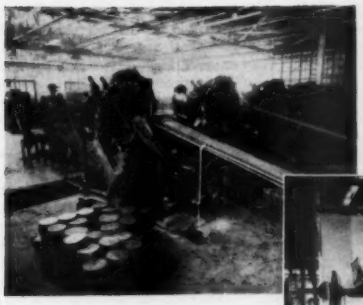


Fig. 7. Left: From press, sheets drop down chute to inclined belt conveyor leading to second press. From second press, they are conveyed to the stacking area

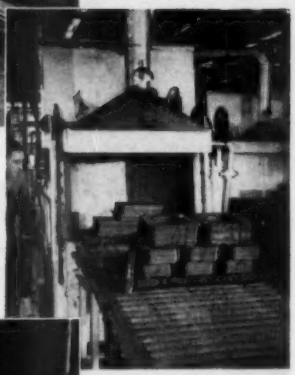


Fig. 8. Right: Pallet emerges from oven and rolls down gravity roller conveyor to cooling area. From here the pallets are moved by a roller-top transfer car to a lateral conveyor-type storage area

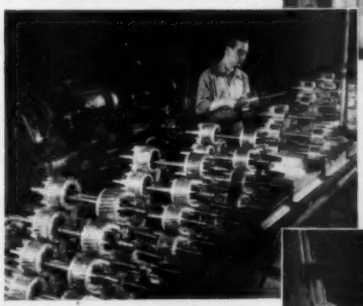


Fig. 9. Left: After cores are shrunk onto the shaft the assemblies are placed on steel pallets for movement through the machinery area

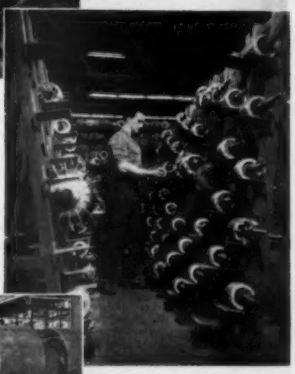
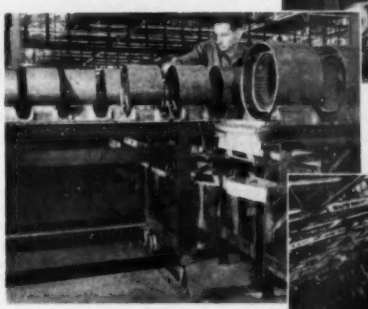


Fig. 10. Right: The completed rotor assemblies are then stored on the A-type racks shown here

Fig. 11. Below: Transfer car takes frames from lateral roller conveyor to another conveyor which delivers them to the press



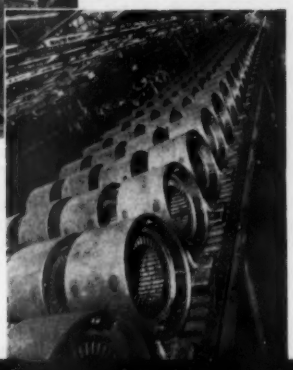


Fig. 12. Right: The completed motor frames are stored on lateral roller conveyors until required

without manual handling and finally emerge as squares 8 to 10 in. in size at the rate of 500 per minute, and are neatly stacked in an open side container. They are then placed on a lift table which automatically lowers as the stack increases in height. When the container is filled the lift table is level with a roller conveyor along which it is rolled to the pick-up station, where it its picked up by a 2 ton floor-operated overhead traveling crane and taken to the floor storage area.

Containers of square sheets are brought from storage by a traveling overhead crane to the unloading rack in front of an inclined press. The sheets are stacked by hand on

Fig. 14. Stators are moved to varnish dip and baking oven over conveyor

the feeder (Fig. 6). After passing through this press the sheets drop down a chute to an inclined belt conveyor leading to a second press. The scrap drops to an underfloor conveyor for final disposal.

As the stator laminations are stripped from the second press they pass down a chute to an inclined belt conveyor leading to a stacking box from which they are taken for sorting and weighing. Figure 7 shows the two inclined belt conveyors associated with these two presses and the final weighing operation.

The weighed stator laminations are wired together and about 20 stator cores are stacked on a pallet which weighs 92 lb and carries a load of 675 lb. These loaded pallets are then taken to the oxidizing oven by a roller-top transfer car specially designed by Westinghouse. The pallet is next pushed onto a roller conveyor leading into the oven, through which it is propelled by a hydraulic pusher. As the pallet emerges from the oven it rolls down a gravity roller conveyor to the cooling area, as seen in Fig. 8. From here they are moved by a roller-top transfer car to a lateral conveyor-type storage area.

Rotor laminations, which have been made substantially as described for stator laminations, are brought from storage on A-type castered racks to the punch presses for punching of the slots. As they are stripped from the press they drop through a chute to a belt conveyor leading to a rotary stacker. Scrap drops to an underfloor conveyor. The laminations are stacked 18 in. high, bolted together and placed on a 24 in. square tray and moved to the die casting machine over a roller conveyor which is connected by a gravity roller conveyor to a reamer. After the latter operation, they are placed on another conveyor leading to the oven where they are heated for the purpose of expanding the bore so that it can be shrunk onto the shaft.

After the cores are shrunk onto the shaft, the assemblies are placed in pockets of a three-pocket hook suspended from an overhead chain conveyor leading to the machining area some 80 ft away. At this point, they are removed and placed on reversible sheet steel pallets for movement through the machinery area on roller conveyors, as illustrated in Fig. 9. The completed rotor assemblies consisting of the core, shaft, blower and bearings are then stored on the A-type racks which hold 5 rotors per square foot of floor

Fig. 15. After cleaning, the stators are moved to the final assembly section

space, which is illustrated in Fig. 10.

Cold rolled steel plate for the motor frames is received in gondola cars in bundles about 9 to 12 in. wide by 22 ft long and weighing from 6000 to 10,000 lb. A 15 ton cab-operated overhead crane carrying an I-beam with a chain sling at each end is used to place these bundles in storage. This crane is also used to take the plate stock, from ⅜ to ½ in. thick, from storage and place it on a gravity roller conveyor which delivers it to another conveyor. The bundle is tipped 45 deg and upset on a series of laterals so

Fig. 13. Matched motor frames, stator coils, etc., are delivered to winding position by a carousel-type conveyor

that the plates can be hooked into position on the roller conveyor which delivers them to the press which, in turn, cuts them into the desired lengths.

Cut plates are stacked on 36 in. square trays with upturned corners provided with holes for chain slings and placed in storage by an overhead traveling crane. They are brought from storage and placed on the platform of the rolling machine by a floor-operated overhead traveling crane and fed singly by hand into the machine, as a mechanical lift raises 15 to 20 plates at a time to the feeding position.

The frames are then formed on a through-roll type rolling machine which ejects them automatically into a V-roller conveyor, discharging to the top deck of a three-deck, double lane metal conveyor and storage chute leading to the seam welder. The welded frames are taken from the seam welder down three-deck, two-lane metal chutes.

The foot members of the frames are received in railroad box cars or trucks bolted together in bundles of 20 or 24. They are unloaded on pallets and moved to storage by a fork truck, and delivered to the foot welding machine by similar means.

From these machines the frames move over a roller conveyor to drill

Fig. 16. Motor is lifted by floor-operated crane and placed over skid bolts

presses for drilling and tapping conduit box mounting holes. They are then stored on lateral roller conveyors until the stator core is pressed into them. A transfer car takes frames from the laterals to a roller conveyor which delivers them to the press, as seen in Fig. 11.

At this point it should be explained that the roller conveyors are provided with safety stops made of ¼ in. thick by 8 in. wide steel plate and are installed between the last two rollers. When the transfer car is brought to the conveyor the stop is automatically depressed through a system of levers, and when the car is moved away, the levers, acting as counter-weights, raise the stop to its normal position.

The assembled frame and stator core are placed on a gravity roller conveyor leading to a welding booth where the core is welded to the frame. From this operation the assembly passes by gravity roller conveyor to double end lathes where

Fig. 18. The crated motors are placed on pallets and moved to shipping area

the rabbet fit for the bracket is rough- and finish-turned. The lathe is loaded and unloaded by a ½ ton hoist on a monorail. The motor stator is then placed on another roller conveyor to be transported to a milling and drilling machine for milling the feet and drilling the foundation bolt holes. Transfer of the stators from the conveyor to the milling and drilling machine is done by manually pushing it, without any lifting. The completed motor frames are then stored on lateral roller conveyors, until ready for the field coils, as shown in Fig. 12.

Stator coils are wound on automatic machines and stacked on peg boards to keep them oriented with respect to phase relationship and order of installing in the stator. When a series is completed it is placed on a belt conveyor for delivery to storage bins. Phase insulation pieces are transported in castered tubs to storage, and slot insulation pieces are discharged as formed directly into tote boxes and trucked to storage. The storage bins for stator coils and phase insulation pieces are adjacent to the roller conveyors leading to the winding section.

Matched motor frames, stator coils, slot cell insulation, phase insulation and wooden wedges are then delivered to the winding positions by a carousel-type conveyor as shown in Fig. 13. This travels at 32 fpm. The winder slides the stator from the conveyor onto a specially designed bench and picks up the matched coils and insulating materials. When the winding of the stator is completed, the winder pushes it on an empty section of the carousel conveyor which delivers the stator to the lead-brazing operation.

From this operation, the stators are moved to the varnish dip and baking oven over a roller conveyor. The conveyor is equipped with an air-operated lift at one end and which elevates each stator to the proper height to be hooked onto an overhead chain conveyor. This conveyor and lift are shown in Fig. 14. The conveyor carries the stators through the preheat section, the first varnish dip vat, first baking, second dip, second baking and the cooling section. At the end of the latter they are removed from the conveyor with the help of another air-operated lift and placed on a roller conveyor. From here they move on to the cleaning section.

After cleaning, the stator is moved to the final assembly section by conveyor. Figure 15 shows the testing of the motors while placed on a

Fig. 19. Scrap moves up inclined apron conveyor and is dropped to the floor

roller conveyor with numerous laterals for temporary storage. These connect with the spray booths where the motors are spray-painted. After painting they pass by roller conveyor through a section where the name plates and identification stickers are attached, and then onto the point where they are fastened to skid bases.

This operation is seen in Fig. 16 where a motor is being lifted by a floor-operated overhead monorail crane and placed over the skid bolts. While still on the roller conveyor a

Fig. 17. Here the shook crate is placed over the motor and nailed in place

shook crate is placed over the motor (Fig. 17) and nailed in place. The crated motor is then placed on a pallet with several others and taken to the shipping department by a fork truck as illustrated in Fig. 18.

As previously indicated, the scrap resulting from the punching of stator and rotor laminations drops from the presses to an under-floor conveyor. This is seen in Fig. 7 where the conveyor is under the floor grating. Figure 19 shows the baling department where the scrap comes up an inclined apron conveyor and is dropped to the floor. A 3 ton three-runway magnet-handling crane picks up the scrap and drops it into the baling machine which is sunk in the floor.

After the baling operation, the same crane delivers the bales, weighing about 300 lb each, to gondola cars. This is shown in Fig. 20. With this arrangement it is possible to produce approximately 200 bales of scrap material a day. The operation of the crane and baling machine is controlled by one man stationed at the pulpit.

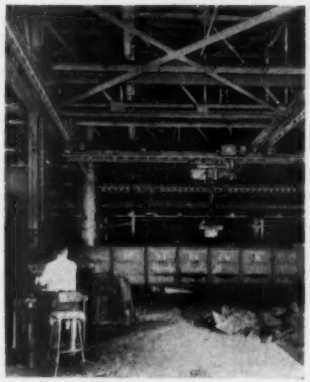
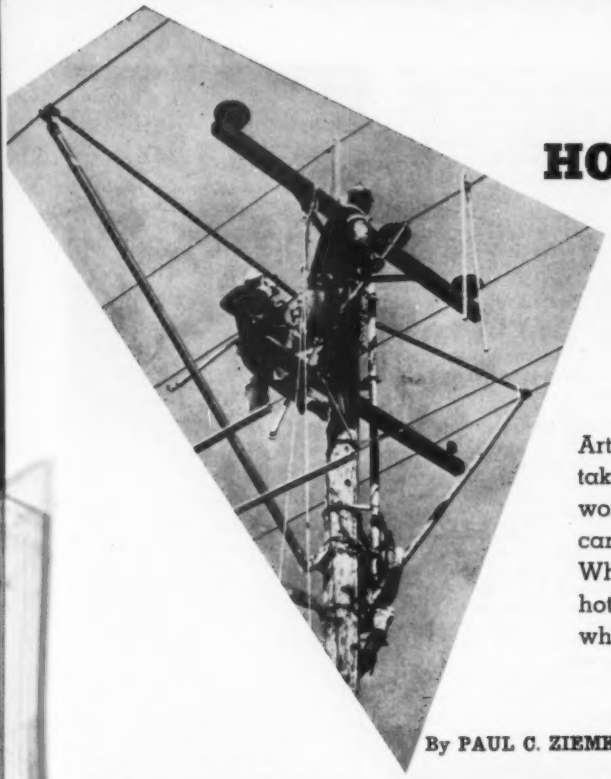


Fig. 20. After scrap is baled, the three-runway magnet delivers bales to cars



HOT LINE TOOLS

Need Care and Constant Attention

Article tells what steps should be taken before performing maintenance work on lines . . . How tools should be cared for after job is completed . . . What to look for when ordering new hot line tools . . . Operating procedure when conducting high voltage tests

By **PAUL C. ZIEMKE**, Safety Engineer, Oak Ridge, Tennessee

THE FIRST PART of this article* stressed the highly important need of buying the best goods the market affords, then inspecting the consignment by a spot test of about 25 units from the gross. Or at least all those items showing any tangible defects, plus the 25 items. All this to insure the man on the stick the very finest equipment. Such precaution is thrown to the winds if the equipment is incorrectly used, or abused by rough handling, or improperly stored.

The hot job should be well planned beforehand by the foreman leading the crew. He must determine the relative position each man is to assume on the pole, what lines or equipment are to be covered, and by what means. The required equipment is issued by the truckdriver and made ready for hoisting by bag and handline. It is a bit difficult to believe, yet it is a fact that each year men die in the act of placing protective equipment *because they fail to use gloves.* Or, having donned gloves, take off a glove for a smoke, then reach over to lend a buddy a hand, *minus the glove.*

The protection is laid on the lower exposures and then proceeds progressively upward. Really effective procedures leave no conductors uncovered, including the transformer case and ground leads. Men should never climb through uncovered lines, or over grounded equipment. Old construction will often present slack circuits where line hose will slip away at the most inopportune times. Tape it on well, or use the spring clips furnished. This applies to pothead covers, blankets for dead ends, cases, secondary racks, and power factor correcting capacitors, which can be securely covered with the bigger blankets.

Once the rubber goods are placed, care must be taken to prevent possible damage by the workmen's spurs, tie wires, block and tackle, or hoist, which may be used for heavy construction work. In any case, it is a fallacy to place too much dependence on the insulation since there is such a thing as stretching luck too far. A minimum of exposure to direct contact is the best rule, always.

After the job is finished, the removal of the protective equipment is done in the reverse order, or from top to bottom to permit a maximum of protection for the line crew making its descent. The removal of outside protection toward the pole is the prescribed technique to keep the climbing space insulated to the last trip through. Again the careful handling of the rubber is in order where the handline and canvas bucket are essential for the lowering operations. Never depend on the rubber goods alone as the safeguard between you and cremation. *Wear those rubber gloves at all times!*

Once on the ground, the equipment is checked for damage, and if dirty may be cleaned when time permits. Carbon tetrachloride in a sealed ½ gal can is ideal to remove the oil and grease normally picked up in contact with oily, old transformer cases, crossarms, etc. A brief airing will soon dissipate the vapors since the carbon tetrachloride has relatively high vapor pressure. It is important to avoid cleaning equipment in confined spaces to eliminate possible concentration of fumes.

Around-the-clock operation of heavily loaded power lines requires that transmission be uninterrupted. This means that all ordinary maintenance on such circuits must be performed "hot." Since many of the lines operate at potentials well beyond that considered safe for men using rubber goods, protection then remains the work of performing hot work by the stint of keeping a safe distance through the use of hot line tools.

The purchase of hot line tools requires care as to selection. Be cer-

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* First part of article "Working with High Voltage? If so—Be Sure of Your Equipment," appeared in the July 1952 issue, page 87.

Photo on this page courtesy of Esso Standard Oil Co.

tain that the manufacturers have subjected their product to the top potential test of 75,000 v per foot of stick. Fittings, clamps and other accessories should be given tensile strength, torsion, or other tests as may be required by the type of service intended for them. Never use untested hot line tools. The items listed below should be checked on any new equipment placed on order.

I. Voltage
II. Type of Construction
  A. Wood Pole Pin Construction
    1. Length of arms
    2. Conductor spacing
    3. Maximum angle on pin type structure
    4. On ridge pin structures—the distance of center conductors above others
  B. Wood Pole Suspension Construction
    1. Length of arms and distance below pole top
    2. Conductor spacing
    3. Maximum line angle
    4. Number and size of insulator units
  C. Wood Pole Dead Ends
    1. Size of arms and double arm spacing
    2. Number and size of insulator units
    3. Distance from arm to first insulator
    4. Type of dead end clamp
    5. Maximum conductor tension
  D. Tower Construction
    1. Details of tower arm at insulator support
    2. Number and size of insulator units
    3. Maximum span length
    4. On suspension—distance conductor is below arm
    5. On dead end—detail of forward yoke plate with the distance to center line of tower arm
    —maximum conductor tension
    —detail of flux rings
III. Conductors
  a. Copper, ACSR, etc. Size and maximum span
  b. Conductor tension
  c. Type of armor rod used and maximum diameter of conductor plus armor
  d. Type of vibration dampers
IV. Specify in detail any unusual conditions pertinent to the work

Hot line tools require special care. The following rules should be adhered to: Keep tools dry. All hot line maintenance tools when not in use should be stored in approved hot room cabinets with a temperature of 90 to 110 F. Keep sticks free of oil and perspiration.

Keep power room or substation sticks in closed cabinet with small heater or carbon lamp to furnish heat. Lacking these, the stick shou'd be on the route list to be sent to the testing laboratory with other line goods.

Do not place hot line sticks on the ground or permit them to touch the ground when lowering them from poles or structures. Surface moisture will accumulate when tools are left on the ground, and they also will become dirty. Always place the tools on a canvas blanket.

When transporting hot line tools, keep them rolled in a canvas blanket, with one layer of canvas between each tool to prevent scars and abrasions. Use a separate and larger canvas to place on the ground.

Hot line tools which are constantly transported on trucks should be checked regularly and re-worked as often as found necessary to keep them in first class condition.

Special hot line tool trailers are available from the manufacturers for complete sets of tools.

When tools need reworking they should be cleaned and sanded down with sandpaper only, and then placed in the hot room for at least 24 hours for thorough drying before treating with varnish. Vertical storing with all parts of the stick well above floor level is desirable as it aids in dispersing moisture. After drying, two coats of approved clear preservative finish are applied with sufficient drying between coats. Proper treating material may be obtained from tool manufacturers. After the finish is applied, the stick is placed in the hot room for at least 12 hours before using. Never use broken or damaged sticks or attempt to repair them with nails or friction tape.

Tools that are in frequent use should be completely refinished at least once each 6 months. Laminated sticks showing any tendency to loosen at the seams or glued joint should be retired from service at once since the moisture continues to infiltrate along the glue line once the outer seal of insulating varnish has been penetrated. Such defective laminated sticks have been known to shatter their full length with explosive force, resulting in the current flowing along the glued seam and burning it with considerable charring, indicating high current-carrying fault paths.

There may be a time when the lineman senses a "fuzziness" or leakage current through the sticks insulation and that of his gloves. Any tendency for the sticks to develop a state of fuzziness is a distinct warning of impending disaster. Such sticks should be retired immediately after completing the particular job.

A recommended operating procedure is outlined for high voltage a-c tests. A description of the operation of a 50,000 to 75,000 v test

These men are making connections for megohmeter test, while line is shut down, to measure the insulation resistance of the insulators. A good insulator will show a high resistance; a faulty or defective insulator, low resistance

Always Keep a Safe Distance

Kilovolts	Clearance in Ft
6.6-7.5	3
13.2-33	4
44-66	5
110-132	6.5
154-176	8
196-220	10

set is presented to show the responsibilities of the operator and to outline the safety precautions which should be observed. The average test set has a capacity of 5 kw and operates from either a 115 or 230 v, 60 cycle a-c source.

The operator is responsible for all switches on the set and must take all necessary precautions when working with this high voltage equipment.

Testing Procedure

1. The set must be properly grounded.

2. Before the operator closes the primary switch to the voltage selector the regulator setting must be checked. It is to be set at line voltage, either at 115 or 230 v. The regulator must be set at minimum value by rotating the handle to its full value in a clockwise direction.

3. The line switch is then checked, plus the circuit breaker and the main switch to make sure that they are in the "off" position.

4. The operator then sees that all persons are in the clear, and that the load is properly connected. Then the ground hooks are removed from the test busses. The cage ground hangs on the hook placed on the outside of the top of the cage. The stick testing yard ground hangs on the latch post of the gate.

5. With everything in readiness the operator will then see that the timer is set to the required time limit, the line switch is closed to the circuit breaker, and the set is energized by pressing the push-button.

6. The limit switches are then tested by opening the cage gate, and that of the stick yard gate. This is only required on the first test run. The red warning light indicates that the line swtich is closed.

7. When the time switch has reached the limit for which it is set, the red lamp goes out and the time switch resets.

8. Do not change the time when energized and do not energize before the time switch has reset.

9. By turning the handle in a counter-clockwise direction the secondary voltage can be raised. *Do not raise the voltage more than 1 kw per second.* For test values under 25,000 v the voltmeter selector switch should be in the down position. This gives full scale voltage of 25,000 v. For test values above 25,000 v the switch should be in the up position; this gives a full scale voltage up to 75,000.

10. In making a test on gloves, the drain should be taken on each glove and logged. This can be done by pressing the button corresponding with the numbered electrodes in the cage. This meter must be protected by a 1/32 amp fuse.

11. Sudden voltage drops are indicative of excessive current flow and the test should be terminated. The primary circuit breaker is best set to trip at a value of 10 amp. The secondary breaker should trip at 0.1 amp at 10,000 v.

12. To discontinue the test, the operator turns the regulator handle in a clockwise direction until the minimum voltage is obtained. The line switch is opened, as is also the circuit breaker and the line switch on the switch track. The high voltage connection must then be grounded by placement of the hook provided.

13. In cases of electrical breakdown on the item undergoing test, proceed to close down the system by following the instructions in No. 12.

14. For making special tests the manual control switch is utilized. First place the timer switch in the off position, next insert the special cord plug-in jack on the control board. The set can then be operated by the switch which locks around the push button control.

Linemen should be given thorough training in the mechanics of using hot line tools before being permitted to use them in actual work on high potentials. An effective method of giving this training is to provide facilities for practice on dead lines. Use the type of tool the job requires for each individual operation. Consider insulating properties, mechanical strength, length, type of fitting, accessories, etc.

In selecting a tool consider the possibility of extra strain due to the position or direction of the line. If there is any doubt about the strength of one tool being sufficient to carry the load, use two. To lessen the breakage hazard, it is advisable to use wood sticks in such a manner that lateral stresses are reduced to a minimum.

Mark Clearances on Sticks

Use markers to indicate safe distances on sticks for the voltage being worked. One convenient method is to use collars made of rubber, or paint red bands to indicate the safe working area for the hands. To be realistic about it, stencil numbered clearances on the stick for specific voltages determined safe for that length of wood. Once marked the lineman should never place his hands above the value marked for the potential worked. Leather gloves only are recommended for work on jobs requiring sticks. This will appear at variance with some operators rules but it is the confirmed opinion of the author that rubber gloves merely add a false sense of security. If a stick feels "fuzzy" with leather gloves it is better to replace the stick rather than endangering your life by switching to rubber gloves.

As an additional precaution, what is known as the "fuzz" test may be used. Place the stick near, but not touching, a high voltage line. If a brush discharge is heard, it is an indication that the stick is not completely dry. On very dry days, with a high barometer reading, however, this discharge is sometimes heard when using dry sticks.

In making this test the following procedure is recommended: Hold the stick upright below the conductor with the lower end in the palm of the hand and support it as near the bottom as possible with the other hand. Bring the stick into the field of the conductor with a vertical motion movement. This method will test the entire length of the stick and will also permit the stick to fall free if a defect appears.

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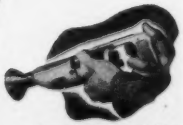

Press loaded Stud Driver firmly against surface, depress safety lever and pull trigger. Explosive charge imbeds stud solidly.

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The mail is sorted into black plastic baskets according to floors. Then the mail basket is placed on a carrier on an endless chain dumb-waiter system. By pressing a button, comb-like teeth on carrier kick basket of mail off on proper floor

This conveyor system delivers the mail dumb-waiter style to any floor in the new Lever home in ⅓ the time required by hand . . . Special carrier mechanism ejects mail basket on floor desired . . . Mail can be delivered in 8 minutes after arriving in the building

Conveyor Delivers Mail—Up & Down

IN THE NEW home of Lever Bros. Co.,* the mail is conveyed from the main station to any floor and automatically returns to the main station from any floor.

This is accomplished by the dumb-waiter conveying system which will kick the basket of mail off on the proper floor. The vertical conveyor is electrically driven by a 5 hp motor housed at the top of the vertical shaft. The motor drives a steel link chain over sprocket wheels located at the top and the bottom of the conveyor shaft.

Attached to the chain are metal carriers which automatically, through a comb-like interlacing action, drop off the load at the selected floor onto a gravity conveyor. The carriers are located 8 ft apart on the chain and move at the rate of 60 ft per minute.

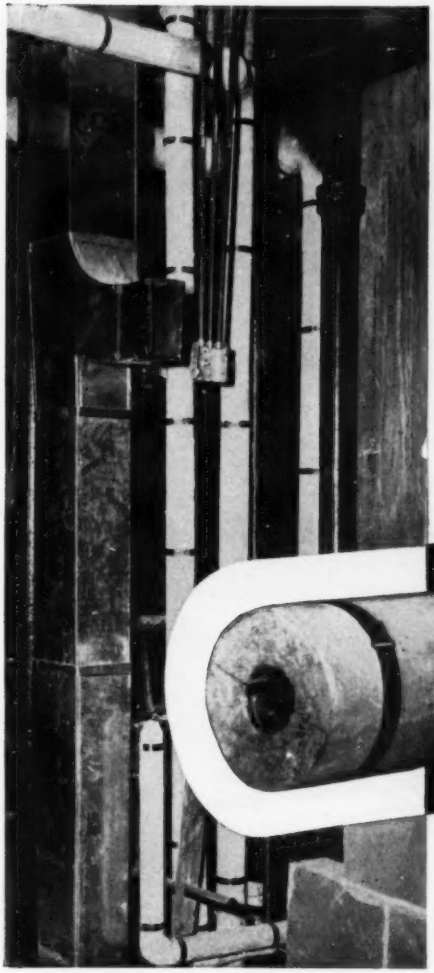
This vertical correspondence conveyor links all 21 floors, has cut down elevator use by messengers somewhat and is saving the company about $150 per week in mail distribution costs. Although the conveyor is designed to handle a maximum capacity of 450 baskets per hour, the average work load is approximately 30 baskets of mail per hour.

With this system, installed by Virginia Metal Products Corp., the mail is delivered in ⅓ the time required by hand.

* See article "Soap Company Bathes Mechanically" on page 69 of the July, 1952 issue of PLANT ENGINEERING.

Closeup shows the moving carrier and the control buttons numbered according to floors. With this system, a piece of mail is delivered in 8 minutes after arriving in the building

This basket of mail has just come off the conveyor shaft and is being sorted by messenger for delivery to personnel on this floor. Mail is delivered in ⅓ time required by hand



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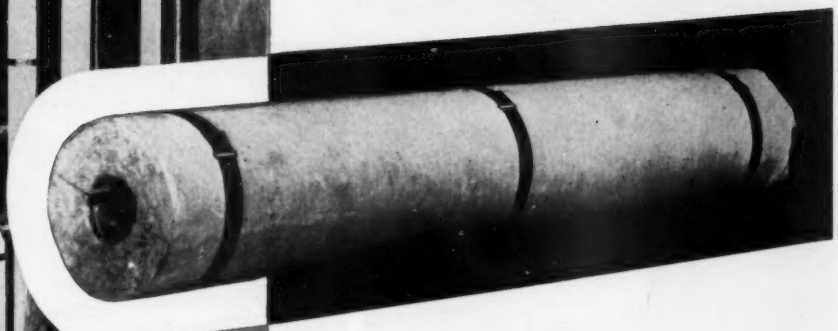

...the easy-to-use, long lasting pipe insulation

Probably no one will ever again need to see this installation of long-lasting Amocel, for "out of sight means out of mind" with this durable insulation. There's no concern about replacement, because Amocel lasts the life of the building, so steam and hot water lines need not be accessible for insulation maintenance. Amocel is Unarco's economical pipe insulation for all commercial uses up to 600° F. temperature. For higher temperatures—up to 1200°—specify Unarco Unibestos. Phone your nearby Unarco Distributor for information and from-stock deliveries. *Write for Bulletin 76-109.*

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The PLANgineers of the Month

A. J. Schuler, Plant Engineer, U. S. S. Lead Refinery, Inc.

E. F. Dow, Methods Engineer, Electric Auto-Lite Co.

R. V. Rogers, Asst. Plant Manager, Morton Salt Co.

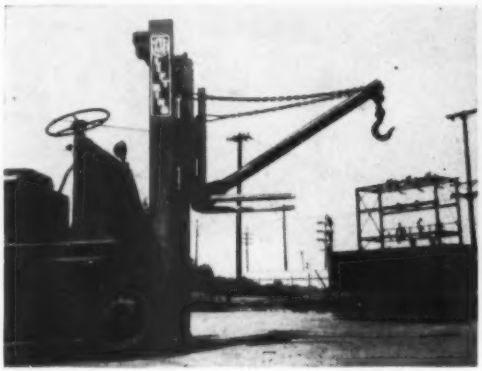
Chester Smith, Works Engineer, Atlas Powder Co.

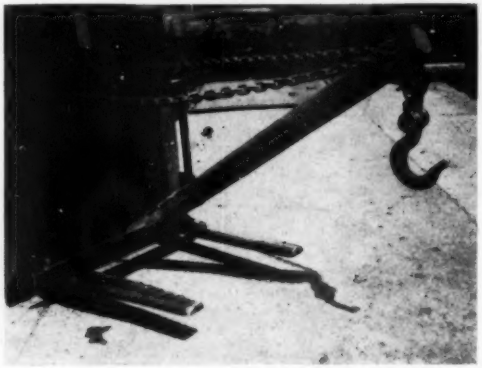
Prize-Winning Idea No. 1 — Fork Truck Boom — A. J. Schuler

THE FIRST PRIZE in the August PLANgineering Contest was awarded to A. J. Schuler, the designer of a detachable boom for a fork lift truck. The boom, readily fabricated in the shop, can be installed on or removed from a fork truck in a matter of seconds, without tools. Stored, it requires a minimum of space, and has no loose parts to become lost. Excluding the hook, the boom is a welded unit.

The boom itself consists of a length of 3 in. pipe, slit at both ends; one end to receive the base plate, cut from ½ in. plate, and the other end to receive the chain used to support the boom. The hook is bolted through a dog welded to the end of the pipe boom.

Installation of the boom on a truck is extremely simple. It requires only the setting of the base plate on the truck forks, and slipping the metal rings (on the ends of the support chains) over the fork uprights. No fastenings are required.





Prize-Winning Idea No. 2 — Fabricated Herringbone Gears — E. F. Dow

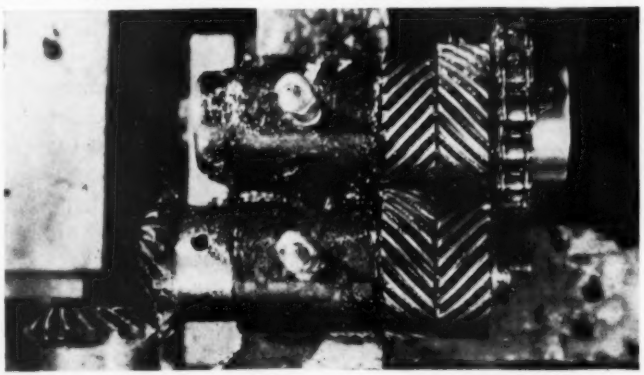
THE BASIC PROBLEM was the elimination of chatter on a milling operation being performed on a two-arbor milling machine. An investigation indicated that a small amount of backlash between the two arbors was the result of the use of a pair of spur gears in the gear train.

A logical solution to eliminate the backlash would be to incorporate a pair of helical gears; however, the thrust imposed by this application could not be carried by the arbors as designed. Thrust bearings had not been provided, and the space limitations prevented redesigning the gear train to provide for thrust conditions.

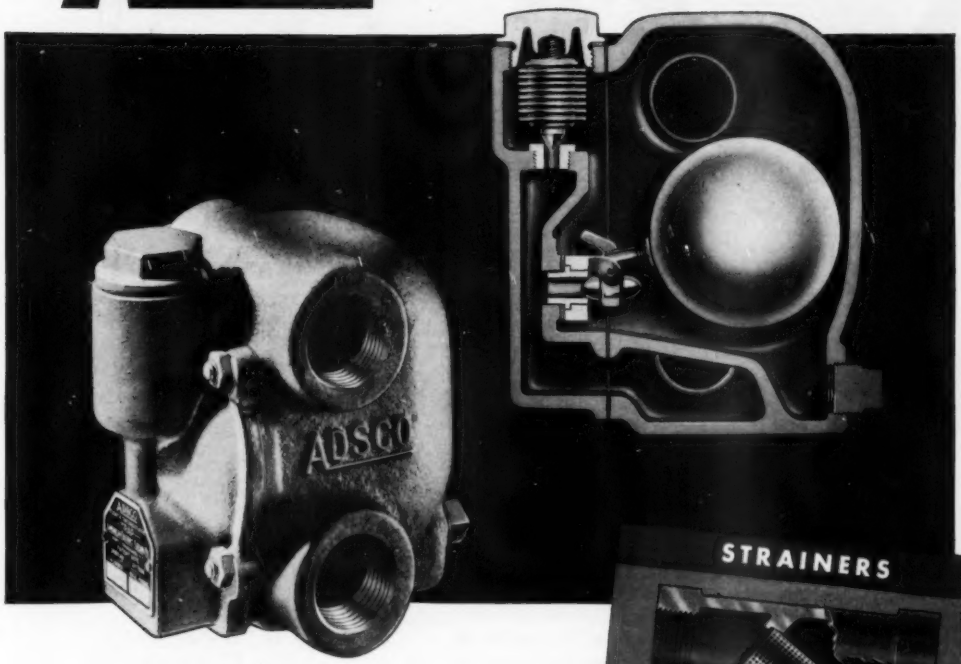
Although it was recognized that herringbone gears could eliminate the thrust problem, the cost of obtaining a special pair of these gears was prohibitive. To circumvent the problem, two right hand and two left hand helical gears were purchased, the face widths reduced as required, and the gears matched. The herringbone gears thus fabricated solved the problems of backlash and end thrust satisfactorily.

Other applications, such as that pictured below, with a pair of the fabricated gears in a welding machine, have proved to be money-saving and operationally successful.

Turn to page 48 for winning ideas 3 & 4.

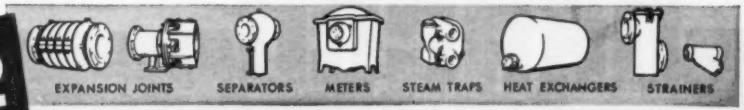


ADSCO DUAL STEAM TRAPS



For low maintenance costs, standardize on ADSCO Dual Steam Traps. ADSCO—and only ADSCO — builds traps with all working parts mounted on the cover. A new cover gives you a new trap. Repair original cover when convenient. Piping connections need not be broken for inspection or servicing. And here's another great feature: valve and seat are reversible, giving double life, double economy. For immediate service, phone your ADSCO Representative today. Shipment will be made from ample factory stocks.

ADSCO
75 YEARS OF LEADERSHIP



AMERICAN DISTRICT STEAM COMPANY, INC.
NORTH TONAWANDA, NEW YORK

ANYONE CAN BUILD A PNEUMATIC CONVEYOR...

It's true! Anyone can build a pneumatic conveyor—*of some sort*. Of course, it won't be efficient . . . it won't streamline your materials handling operations . . . and it won't reduce your handling costs — but it will be a pneumatic conveyor.

However, in solving your bulk materials handling problems, you will want to investigate Dracco Airstream Conveyors. Each high-efficiency, automatic Airstream Conveying system is:

1. Designed for a cost-saving solution to your specific handling problem.
2. Designed accurately by engineers having many years of experience exclusively in this field.
3. Constructed of quality materials for long, trouble-free service.

If you are handling bulk granular or powdered materials, remember that Dracco Airstream Conveyors possess unique advantages over any other type of system.

DRACCO CORPORATION
Harvard Ave. and E. 116th St., Cleveland 5, Ohio

Bulletin 529 presents complete, technical information on handling bulk materials with Dracco Airstream Conveyors. Write Dept. P-8, Cleveland 5, Ohio, for your copy.

DRACCO *Performance Proved*

Airstream CONVEYORS · DUST CONTROL EQUIPMENT

W. J. BILL of DOW CHEMICAL SUBMITS WINNING IDEA IN CONTROL DERBY

Mr. W. J. Bill of Dow Chemical Company, at Bay City, Michigan, writes in about an unusual system which has been devised for the evaporation of liquid chlorine. Mr. Bill won an award in the Honeywell Industrial Control Idea Derby for his report of the operation.

The simplicity of the system is its outstanding feature. Based on control of the pressure of the chlorine gas, it uses a bank of infra-red lamps to supply the heat required for evaporation. The chlorine gas line is connected to a 2,000-pound liquid chlorine delivery cylinder. A Honeywell *Pressuretrol* unit is installed in the gas line . . . and, through a relay, it turns on and off a bank of infra-red lamps which shine against the side of the cylinder.

The heat generated by the lamps evaporates the chlorine until it reaches a pressure of 50 psi, and then turns it off. As soon as the pressure drops a little, the lamps are turned on again. By setting the *Pressuretrol* unit for a small differential, the gas pressure can be closely controlled.

The system assures a constant supply of 50 psi chlorine gas . . . with an absolute minimum of trouble in changing cylinders and hooking up.

Honeywell *Pressuretrol* Unit

NEW NEWSPAPER HELPS PLANT ENGINEERS

Honeywell's Industrial Division now issues a periodic publication—*Industrial Control News*—which contains detailed information on many new and unusual applications for automatic controls throughout industry. In its pages, production and maintenance men tell how they are reducing costs and increasing operating efficiency on all types of equipment. According to a release from the company, anyone interested in industrial controls can contribute to *Industrial Control News* . . . and can receive copies . . . by sending name, company, title and address to MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Station 40, 4491 Wayne Ave., Philadelphia 44, Pa.

do you have an "IDEA" for the

Honeywell Industrial Control

IDEA DERBY?

Just send us a sketch and description of how a non-indicating control is now being used to help keep things running smoothly in your plant. Think about it! Then send it in! An impartial board of judges will rate it in terms of its importance to the maintenance of plant operations. You may win a Honeywell Electric Clock Thermostat or one of the other special awards. All material submitted becomes the property of MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4491 Wayne Ave., Philadelphia 44, Pa.

Win a
HONEYWELL ELECTRIC CLOCK THERMOSTAT

MINNEAPOLIS
Honeywell
First in Controls

SELECTION, USE AND CARE OF TOOLS

Masonry Drills—The many types of drills used by hand, in rotary electric drills, and electric and pneumatic hammers, are discussed and suggestions given on the proper use of drills

By THOMAS TRAIL, Maintenance Engineer

MASONRY DRILLS are made in hand types, and in types for use in rotary electric drills, electric hammers and pneumatic hammers. Hand type drills are available in several styles. In Fig. 1 is shown a star or four point drill. This has four cutting edges. Fig. 2 shows a three point drill, having three cutting edges.

For hand drilling and for use with power hammers, the drills shown in Fig. 3 (in straight flute pattern) and in Fig. 4 (in twist flute pattern) are also available. These are fitted with a tapered shank that fits a tool holder, Fig. 5, for use in hand drilling, and a chuck, Fig. 6, for use with a power hammer.

The molded rubber grip, Fig. 7, can be fitted to the hand tool holder shown in Fig. 5, to provide a safer and more comfortable grip on the tool holder, as well as furnish a cushion to absorb vibration from hammer blows.

Fig. 8 shows a carbide tipped drill for use in a hand brace or rotary drill, or in an electric drill.

Fig. 9 shows a star drill with tapered shank to fit the chuck used with a power hammer, and Fig. 10 shows a three point drill for the same purpose.

In selecting masonry drills for hand and power drilling, the types shown in Figs. 2, 3, 4 and 10 possess advantages over the star type drill shown in Figs. 1 and 9. They can be sharpened more readily on an ordinary grinding wheel; require no reforging as do ordinary star drills; have parallel sides instead of tapered sides, thus maintaining the cutting diameter; have a larger diameter handle and thus are easier to turn and strike; are less likely to bend under hammer blows; and can be used down to the shank, thus providing longer cutting life.

To obtain best results when drilling, always maintain sharp cutting edges on the drill. This will insure drilling the true diameter, and will help eliminate binding of the drill in the hole and consequent breakage. The star type drill, however, decreases in cutting diameter each time it is resharpened. For this reason, it should be reforged to original size whenever its cutting diameter becomes too small.

To help prevent jamming of the drill in the hole, rotate the drill after each hammer blow. When using the twist flute type drill, it is necessary to rotate it in a clockwise direction through a complete circle. This will cause the cuttings to be carried from the hole.

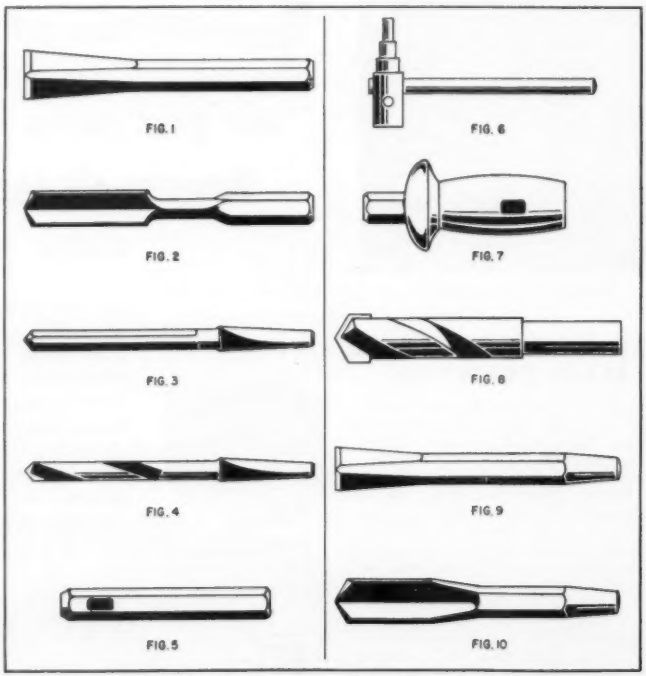
The drill should be struck squarely on top with quick blows from a lightweight hammer. This will insure easy and comfortable drilling. The use of a heavy hammer and heavy blows slows up drilling progress and is likely to cause drill breakage.

In using a power hammer for masonry drilling, the same general precautions should be observed. In addition, avoid permitting the drill to bounce loosely in the hole being drilled; do not allow the weight of the hammer to rest on the drill; and hold the hammer straight so as to avoid bending or breaking the drill.

The carbide tipped drill can be used to drill brick, wall tile, plaster, masonry and cement without reinforcement. The best drilling speed for drills ¾ in. in diameter and smaller is 350 to 800 rpm. For larger drills 350 to 500 rpm should be employed. Sufficient pressure should be applied to keep the drill cutting. When inserting or withdrawing the drill from the hole being drilled, keep it rotating at full speed.

Masonry drills are relatively sturdy, but to prevent damaging the cutting edges and bending or breaking the drill shanks, always lay them down carefully and do not throw them into tool boxes among other tools. A separate wood box or tray, or a block with a row of holes drilled in it, are suggested means of protecting such drills and keeping them conveniently available.

An occasional wiping of the surfaces of masonry drills with a slightly oily cloth will help prevent rusting when not in use.



A variety of masonry drills, from hand type to power hammer driven, is shown

For Planes or Plants...

PLEXIGLAS Glazing

Strength and durability won PLEXIGLAS its place as aviation's standard transparent plastic. The same qualities make this acrylic plastic equally valuable for long-service glazing in industrial plants where breakage is a problem.

Light in weight and highly resistant to breakage, PLEXIGLAS can be installed quickly and economically. No sash or framing is needed where corrugated sidewalls and roofs exist. Corrugated PLEXIGLAS sheets can be lapped-in and attached to the structure's corrugated sheathing. Flat panels can be installed in standard metal or wood sash.

White translucent PLEXIGLAS also provides *completely diffused* daylight inside the building. High transmission of visible light and low transmission of solar heat are further advantages. If you have a glazing problem, flat or corrugated PLEXIGLAS may solve it for you. For full information, write today.

PLEXIGLAS *is a trademark, Reg. U. S. Pat. Off. and other principal countries in the Western Hemisphere.*

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CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

NEW PRODUCTS summarized for your convenience

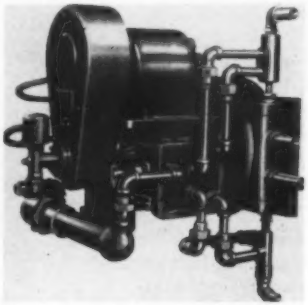
Edited by M. E. Heniken

Use the postage-free cards on pages 35-36 and 133-134 to ask for more information on these products. List item numbers on those products in which you are interested.

1—ROTARY BURNERS for conversion, new installation

Originally manufactured exclusively for company's steam generators, these horizontal-rotary design burners are now available for broader use. They were developed to achieve complete combustion and thus effect high efficiency with fuel economy and are said to provide dependable, automatic operation, precise control of firing rates and accurate control of flame contour.

Among the design features stressed for the burners are: V-belt drive for the high cup speed essential to efficient



atomization; dual pumps and reservoir combined with constant oil rate control, and four-hole hinge which circulates oil through the oil heater so that oil is on the pressure side of the pump to permit burning of oil at higher temperatures. The burners handle any grade of oil and are also available with combined gas burner. They come in sizes to 500 hp with dual ignition, high-low or modulating control. Superior Combustion Industries, Inc.

2—INDICATOR measures differential voltage

This indicator is designed to measure not only differential voltage, but also amperage, speed, pressure and other quantities which can be converted to voltage. Basically a high-resistance precision voltmeter containing an electronic amplifier, this new device has a self-balancing circuit which possesses a high degree of stability and freedom from drift, company explains, and it can measure a 0.001-30 v differential of two input voltages ranging from 1-400 v providing they do not differ by more than 300:1. The instrument can be set to indicate full scale for voltages as small as 0.022 v, and the scale can be marked in volts, amps, feet per minute.

Used with standard accessories, such as a recorder, indicating instrument, or alarm relay, the indicator will record deviations at a point remote from the installation, or sound an alarm when deviations occur. General Electric Co.

3—UNIVERSAL NIPPLE CHUCK threads ⅛- to 2-in. pipe

Announced as the last word in simplicity, the Model 55 has but three parts: polished steel body, sliding plunger and hardened steel threaded shank. Nipples are removable by hand. Adapters allow for all sizes from ⅛- to 1½-in. pipe—no adapter is needed for 2-in. pipe. An inserted pin retains the sliding plunger in working position.

Usable four ways—with pipe machine, power drive, pipe or machinist's vise—the Model 55 offers economy by converting short lengths of pipe into useful all-thread or close-thread nipples. A sheet metal kit box for carrying the chuck and adapters is an optional extra. Beaver Pipe Tools, Inc.

4—PLASTIC MIRRORS for use where breakage is problem

The adaption of Homalite CR-39, a clear, thermosetting plastic, to the manufacture of unbreakable industrial mirrors is announced by the Homalite Corp. and Flexmir Metallizing Co., Inc. These mirrors are suggested for use not only where breakage is a factor, but also where glass and thermoplastic materials are attacked by chemicals, and in applications where extreme heat or weight are factors. It may be machined before and/or after treating with mirroring materials.

Mirrored Homalite CR-39 comes in thicknesses from $\frac{1}{16}$ to ½ in. and in sizes to 28 by 50 in. and may be machined to order. The Homalite Corp.

6—HYDRAULIC SCOOP is attachment for fork truck

To further increase the versatility of their standard fork trucks this company offers this hydraulically powered

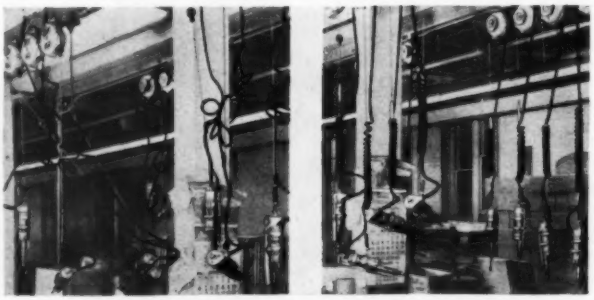
scoop for handling dry bulk materials such as sand, salt, coal and sulfur. Dimensions and capacities vary with the type of material to be handled and the size truck to which the scoop is attached. The model designed for use on a 4000-lb capacity truck has a maximum capacity of 25 cu ft or 3200 lb.

A double acting hydraulic cylinder controlled by a valve on the truck's cowl provides control of the scoop body to facilitate loading and dumping. The Elwell-Parker Electric Co.

7—ANGLE-HEAD DRILL does close-quarter drilling

Described as the lightest of ½ in. angle drills, this one has a small, compact, angle-head which can be swiveled to

(Continued on page 121)



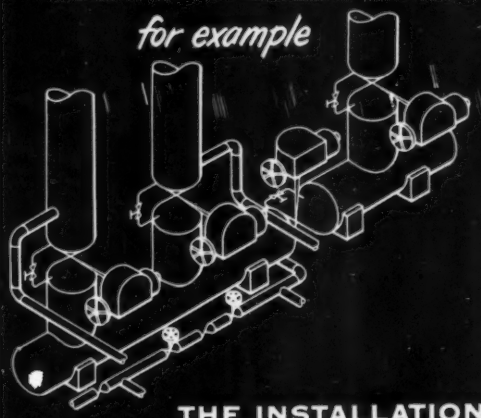
5—TOOL CORDS coil back in place when not in use

How Koiled Kords permit more efficient use of portable tools by overcoming the problem of dangling, tangled wires is illustrated in these pictures. They were taken at the same plant before and after installing the retractile cords.

The cords are Neoprene jacketed and coiled into a spring-like shape that extends up to six times their length and retracts when tension is lessened. Used exactly like straight cords, Koiled Kords may be purchased in 4-ft mandrel lengths or made to specifications in combinations of coiled and straight lengths. Folder KKG describes these cords in detail. Koiled Kords, Inc.

Are Your Valves Giving this Low-cost Service?

...on Main Steam Lines, for example



THE INSTALLATION

Crane 900-Pound Pressure-Seal Bonnet Gate Valves, motor-operated, on main steam header, in a mid-western public utility power station.

VALVE SERVICE RATINGS

FEATURES:	Pressure-Seal Bonnet Joint and Flexible Wedge Disc
SUITABILITY:	Latest High Pressure Service Design
MAINTENANCE COST:	None in 4 years—except lubrication
SERVICE LIFE:	Should outlast any bolted bonnet valve
OPERATING RESULTS:	No forced outages for valve repairs
PRICE:	In line for modern, high quality valves
AVAILABILITY:	Regular item in Crane line

THE HISTORY

This battery of 10-inch Crane Pressure-Seal Bonnet Gates has been in operation about 4 years on 825° F. —825 psi steam. Their performance is rated in direct comparison with bolted-bonnet valves, same size and pressure class, on identical service in the station.

While installed some years earlier, the bolted-bonnet valve records show considerable repairs for seat leakage, and difficulty in keeping bonnet joints tight. The plant also reports trouble with discs sticking shut.

In contrast, Crane Pressure-Seal Valves have given satisfaction since installed. Seats and bonnet joints alike remain leak free, tight as new. Valve operation is smooth and positive.

THE VALVE

Here is simplified development of the pressure-seal bonnet principle. Crane Pressure-Seal Gate Valves eliminate bonnet joint leakage and maintenance with a one-piece seal ring design, using no gaskets or auxiliary parts. Readily accessible, the joint needs no special tools for dismantling. Self-adjusting to temperature effects, Crane flexible wedge disc prevents sticking; takes minimum torque to open, hot or cold. See your Crane Representative or your Crane Catalog for full data on these modern valves in 600, 900 and 1500-pound pressure classes.

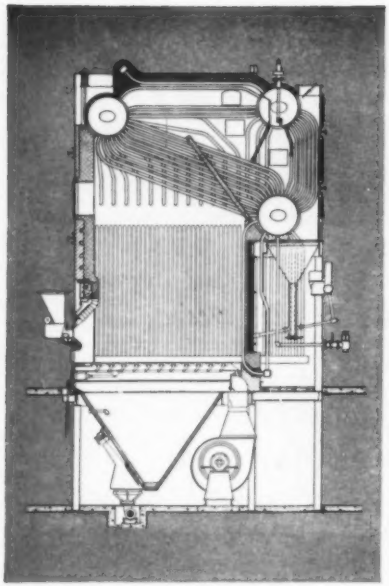
The Complete Crane Line Meets All Valve Needs. That's Why

More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



USER
Reeves Steel & Mfg. Co.
Dover, Ohio

BOILERS
2—ERIE CITY
Type 4-C 3-drums

CAPACITY
2-Boilers
45,710 lbs. steam/hr.

FEEDWATER TEMP.
218-220

OPERATING PRESS.
145-150 lbs.

STOKERS
2—ERIE CITY Dumping Grate Spreaders
Lbs. Coal/hr.
2-Boilers 5322

COAL
Ohio Strip Mine
Nut & Slack (10,500 B.t.u.)

Saved $68,670 in 12 months

BY TWO ERIE CITY BOILER-STOKER COMBINATIONS at REEVES STEEL and MANUFACTURING CO., *DOVER, OHIO*

It is estimated that the entire cost ($225,000) of revamping the old boiler plant will be amortized in 39 months. This cost includes the removal of an old coal trestle, coal handling equipment and the two old boilers. Also included are the costs of 2 new Erie City Spreader Stoker-Steam Generators, new coal storage and ash handling facilities, 300 ft. of new steam header and extensive building changes. The 1951 savings are shown at the left.

1951 SAVINGS

	Savings
Coal for 1951	10,682 Tons
Fuel Cost	$38,578
Operating Labor	$ 9,353
Service Dept. Charge	$ 4,677
Repairs & Maint.	$16,062
1951 Savings	$68,670

You can depend on Erie City for sound engineering

ERIE CITY
112 Years in Steam Generation

ERIE CITY IRON WORKS • *Erie, Pa.*

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS
UNDERFEED AND SPREADER STOKERS • PULVERIZERS

Here's *FLEXIBLE* protection in a space-saving design!

Reliable low-voltage circuit protection now comes in smaller, lighter, easier-to-handle units. Note in the picture above how the new Westinghouse DB-50 Breaker (left) is nearly 50 percent smaller than the superseded DA-50. More important, note how the new space-saving design gives you an even greater measure of flexibility.

Every breaker in the complete DB line is equipped with an adjustable overcurrent tripping device which provides—*in a single unit*—combinations of delay and instantaneous characteristics for many applications. And you get this flexibility in every low-voltage application because DB Breakers are available in a space-saving design for 15,000, 25,000 or 50,000-ampere interrupting duty.

The smaller, more flexible DB design is another contribution of Westinghouse engineering augmented by constant High Power Laboratory research.

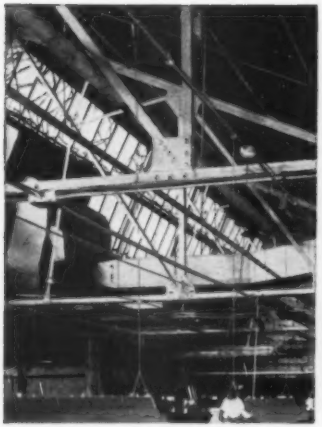
For additional information, write for Booklets, B-4067 and B-4740, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-60789

DESIGN TESTED AND VERIFIED in the Westinghouse HIGH POWER LABORATORY

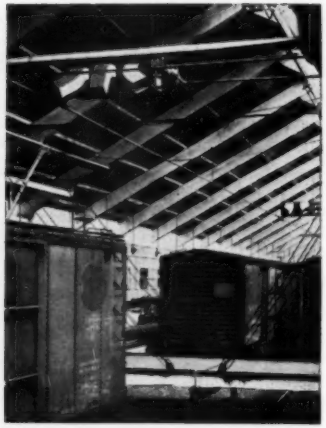
YOU CAN BE SURE...IF IT'S Westinghouse

"DE-ION" CIRCUIT BREAKERS TYPE DB



Fresh Air is introduced through the saw-tooth. Torridor warms this air quickly and delivers it through ductwork.

Employees Stay Warm and draft-free in this production area, warmed by Torridor inverted ceiling type unit.



Torridors Kill Drafts at the doors to this covered track, get warmth right down to the loading dock.

How you can "tailor" TRANE torridors to fit your special heating problems

THINK of a *tough* heating job—where you need a big volume of warmed air. Then take a TRANE Torridor with the needed fan capacity. Add to it the exact amount of heating surface the job calls for, the motor with the right horsepower, the most economical drive, the most efficient controls. Result: you have actually "tailored" this one unit heater to handle your heating job perfectly . . . and it doesn't cost you one cent extra!

That's because TRANE Torridors give you an *unmatched choice* of component parts. You can select from 5 basic models, 10 cabinet sizes and a wide range of motors, filters, controls, dampers and heating coils. Motor or direct drive; 2, 3 or 4 outlets. Thus you can specify the *exact* unit for your job.

And this blower-type unit works almost anywhere. It heats big spaces like assembly areas. It delivers heat to order. It pinpoints large volumes of heat for process work. It works either with or without ductwork. It can introduce outside air, if desired—tempered by famous TRANE Kinetic Orifice coils.

This versatility and freedom of choice is characteristic of the full TRANE line of unit heaters. *Six different types* for every unit heater job. Prompt delivery on current orders. See your nearest TRANE sales engineer or write for Bulletin DS-327A.

TRANE Projection Heater with Louver Cone Diffuser gives 60% greater heat-throw.

TRANE Model H Unit Heater with Louver Fin Diffuser does the work of *two* units.

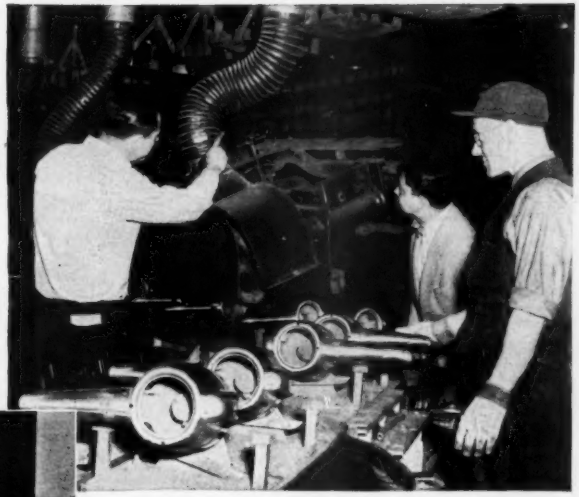
TRANE Float Trap (shown), Bucket and Thermostatic Traps give perfect results with TRANE Unit Heaters.

TRANE

THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division, Scranton, Pa.
Trane Company of Canada, Ltd., Toronto
Offices in 80 U.S. and 14 Canadian Cities

MANUFACTURING ENGINEERS OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

Whether
DUST REMOVAL
or
MATERIALS HANDLING



You can install SPIRATUBE® yourself

Whether your application requires dust removal . . . or materials handling . . . you can set up your lines of SPIRATUBE to meet your requirements. AND . . . what's more important — you can do it yourself. That cuts downtime to a minimum, and enables you to keep your ducting system in operation to meet your production needs.

SPIRATUBE — the new type flexible tubing — connects quickly, easily to your present lines . . . and bends anywhere with minimum crimping. No turn is too short, no angle too acute. No elbows or special fittings to bother with in going around obstructions!

And — important to you too: The initial cost of SPIRATUBE is small . . . and its life equals — sometimes exceeds — rigid ducts.

Standard sizes for all requirements are immediately available from well-stocked distributors — coast-to-coast.

FOR ALL DUCTING SYSTEMS: **FLEXFLYTE®** **SPIRATUBE®** **AYRTUBE®**

Flexible Tubing
CORPORATION

Guilford, Connecticut **Pasadena 1, California**

FREE! Full details on this amazing, cost-saving ducting. Fill in coupon and mail

FLEXIBLE TUBING CORPORATION **Dept. PE-2, Guilford, Conn.**

Please send me your new catalog on Flexible Tubing products.

My application is_____

Name_____ Title_____

Company_____

Address_____

City_____ State_____

ONE-MAN HANDLING

for loads up to 15 tons

Here's the low-cost way to lift, transport, lower and stack heavy materials *anywhere* within an entire bay! One man with a push-button does the entire job with a P&H Trav-Lift without rehandling!

The Trav-Lift is custom built to your requirements. With variable speed full magnetic control, you may have five distinct steps for all motions to meet every need for speed or precision handling.

A number of standard designs enable us to meet your needs at far lower cost when service requirements do not warrant investment in a heavy-duty crane. The Trav-Lift is a product of P&H — America's leading builder of overhead handling equipment.

Handle it "thru-the-air" at lower cost.

P&H OVERHEAD CRANE DIVISION

HARNISCHFEGER CORPORATION

4682 West National Avenue • Milwaukee 46, Wisconsin

Power Shovels • Crawler and Truck Cranes • Overhead Cranes
Hoists • Arc Welders and Electrodes • Soil Stabilizers
Diesel Engines • Pre-Fabricated Homes

DARE TO COMPARE!

See the Life-Linestarter® Strip-Down Test for Stepped-Up Maintenance

Easier Installation . . . Because of standard NEMA mounting; straight-through wiring; pressure-type connectors; drawn cover.

Easier Maintenance . . . Because of fewer moving parts; all front-removable. So simple that you can actually do it BLINDFOLDED.

Longer Life . . . The chief electrician of a southern mill* says: "Our Life-Linestarters started and stopped the motor 5,700 times daily. After at least a million cycles, contacts showed little wear." J-30098

*Name on Request.

YOU CAN BE SURE...IF ITS Westinghouse

Life-Linestarter

SEE THE STRIP-DOWN TEST AT NO OBLIGATION!

It will open your eyes to Life-Linestarter's Stepped-Up Maintenance and Performance. Mail the coupon today!

Westinghouse Electric Corporation
Box 868, Pittsburgh 30, Pa.

Name_____

Title_____

Company_____

Address_____

City_____ State_____

News From the Plants

World's Largest Switchgear Development Lab Begins High-Voltage Tests

Short circuits of 5,250,000 kva—the most powerful ever produced in a research facility—are created for power-equipment tests in the General Electric Company's new switchgear development laboratory recently opened in Philadelphia, Pa.

Two generators, designed especially for testing and the largest ever built for short-circuit testing, combine to provide the necessary power. When operated in parallel, the two units can deliver 5,250,000 kva asymmetrical or 3,200,000 kva symmetrical at 15.5 kv, 3 phase.

The laboratory consists of a control building, a test building, and a high voltage yard.

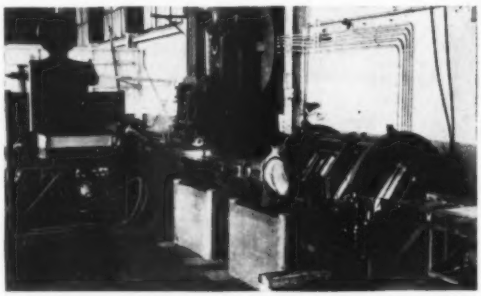
The control building houses the intricate controls and instruments used in conducting short-circuit tests, and is equipped with panoramic shatterproof windows through which engineers at the main control board can watch the equipment being tested.

The all-steel test building is divided into two sections. One contains the incoming power source equipment, distribution apparatus, the two testing generators, exciters, reactors, bus runs, circuit breakers, synchronous closing switches and auxiliary service equipment. The other is equipped with machine and assembly shop facilities for preparing apparatus for test.

The high-voltage test yard is equipped with two 100,000 kva, single-phase testing transformers, grounding and tap-changing switches, lightning arresters, two 10,800 kva capacitor banks and high-voltage connections for tests above 15.5 kv and up to 440 kv.

Combination Shear and Turnover Machine Speeds Bar Inspection

Cast bars of brass have to be cropped at one end and inspected on both sides before they enter the rolling mills that make them into coils of light gauge sheet.



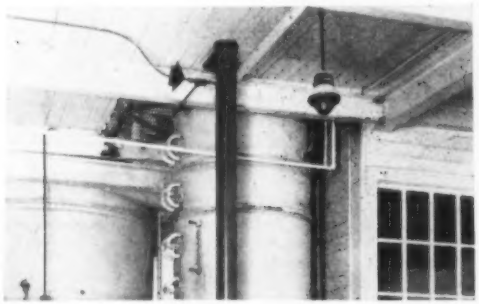
Chase Brass & Copper Co. combines these two operations with special machinery at its mill in Waterbury, Connecticut, to expedite operations and insure against surface defects in bars.

Bars from the casting shop, weighing up to 1100 lb, enter the machine on a roller conveyor. The heavy duty mechanical shear crops the "tail" from the 2½ in. thick brass bars. The operator inspects the cut cross section of each bar under a bright light, then moves it onto a conveyor leading to the bar turnover machine.

In the turnover machine, held between heavy rollers, the 25 by 64 in. bar is revolved in its cage, then moved out on the conveyor as the turnover machine operator inspects the other side of the bar for surface defects. It is then moved off the conveyor, onto a pile awaiting fork truck transportation to the sheet mill.

Vapor Explosion Hazard Reduced with Fire Detector Alarm System

The use of a fire and overheat detector has been instrumental in eliminating an explosion hazard in the distilling plants of Schenley Distillers, Inc. The hazard formerly developed when excessive pressure in a beer, whiskey, or alcohol still caused mechanical relief devices to operate, permitting vapor to escape into the building.



To eliminate this condition, a protective venting arrangement was devised by Schenley engineers. Seal pots (water filled pressure relief devices) were designed to include a 6-inch copper duct to carry the vapor directly from a "blown" pot to the exterior of the still buildings. This construction prevents the release of vapors inside the building, but raised the problem of finding a quick, positive means of detecting the escape of the alcohol to keep product loss to a minimum.

Heat detecting units of explosion-proof construction were selected to trigger an alarm system. The detector reacts to the escaping hot vapor (about 220° F) and actuates both a visual and audible alarm.

The Detect-A-Fire, manufactured by Fenwal, Inc., operates when the temperature of the surrounding medium reaches the set-point temperature. An unusually rapid response is obtained because it is unnecessary for the unit itself to heat up to temperature.

Stud Welding Speeds Installation of Corrugated Siding on Warehouse

Erection of the Port of Boston Authority's new Mystic Pier No. 1 featured the use of stud welding to solve two difficult problems—one presented by the building design and the other* by atmospheric conditions in a 246,000 sq ft transit shed surrounded on three sides by sea water.

Approximately 560 squares of corrugated asbestos siding, which completely encloses the building, were installed with ¼ by 1½ in. stainless steel studs, end-welded with a Nelson stud welding gun.

Use of these fasteners, with solid zinc alloy collarnuts, and of cadmium plated studs for installation of corrugated asbestos interior fire curtains, was specified in place of clips and bolts for easier installation.

More than 32,000 lineal ft of sprinkler lines installed in this transit shed had to be placed above the bottom chord of the welded roof trusses, which support a flat concrete roof deck. For this installation, the contractor adopted stud welding in the interests of speed and economy, as well as appearance. More than 4,000 ½ by 2 in. female studs were stud welded on the underside of the flanges at the top of the trusses and ⅜ in. rods of the proper length were used to extend the supports to the level of the sprinkler lines.

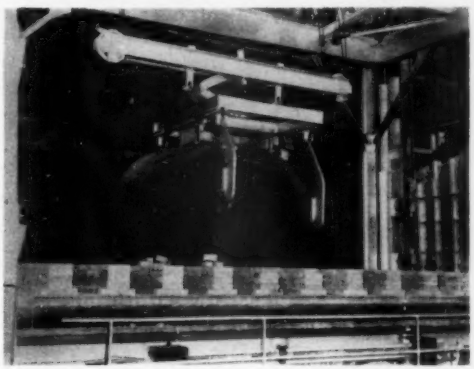
Tank Turrets Get a Lift on New-Type Tongs in Heat Treating Process

Red hot turrets for new Army tanks are picked up automatically, quenched in a 50,000 gal water tank, and then put on cars for reheating by these ingenious new tongs especially designed for the General Steel Castings Corp., Eddystone, Pa., a major supplier of tank turrets to the Philadelphia Ordnance District.

Use of the tongs, manufactured by Heppenstall Co., Pittsburgh, permits the operations of heating for hardening, quenching, tempering, and requenching to be handled by remote control, saving time and eliminating a potential hazard to workers.

Photo shows a turret being lifted from an electrically controlled car on which it just emerged from the furnace at right. At the outset of World War II, tank hulls and turrets were formed of sheets of steel, held together by large rivets. Experience in North Africa showed that when a projectile struck a tank, even though it did not pierce the armor, it might cause the rivets to shear off inside of the tank, endangering the tankmen.

To eliminate this danger, Ordnance engineers quickly swung over to the use of cast steel turrets, with either cast steel or welded steel hulls. In the casting process, molten metal is poured into a mold, of the shape desired. After it cools, a cast turret is hardened and tempered to give it the greatest possible strength and resistance.



Diesel Package Units Generate Hospital Emergency Power

Installation of three emergency Diesel generator sets serves as a modern example of complete electric power protection at Jackson Memorial Hospital, Miami, Fla.

The generator sets will operate in parallel with the use of a panel switchboard and will handle the whole load of the hospital on a standby basis. Generator voltage of 4160 will be stepped down to 120 and 240 circuit voltage to meet hospital requirements. The sets are rated at 314 kw apiece for the standby application and produce 3-phase, 60-cycle current. They are designed and produced as package units by Caterpillar Tractor Co.

Included in the Jackson hospital application are exhaust mufflers and intake air silencers. Within the power house, the engines are arranged for maximum servicing and operating efficiency, with special platforms provided for checking, lubricating and servicing. Air starting is used, and engine cooling is by means of heat exchangers.

Portable Air Movers Keep Welders Cool in Fabrication Shops

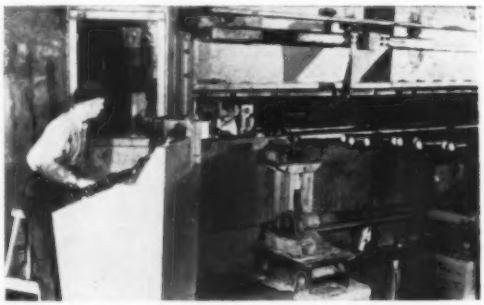
To remove fumes and sparks from welding operations, Eddystone Division of Baldwin-Lima-Hamilton Corp. has equipped welders in its shops with portable, compressed-air type ventilating air movers. These inexpensive devices have proved to be more satisfactory than a permanently installed ventilation system.

The convenience of portability of the M.S.A.-Lamb air movers permits welders to put them close enough to welding operations to remove practically all fumes and sparks, discharging them into the upper atmosphere of the building. Though nearly 3 ft long overall, their weight is largely in the base, so they stand readily in almost any position. This flexibility in handling makes them easy to use outside or inside of weldments.

Favorable features include the small investment required and the fact that installation of extensive duct work was not required throughout the plant. Also, no maintenance is required for the air movers.

Automatic Machine Pre-tests Pipe at High Pressures

Pressure tests of pipe to 80 per cent of the yield point are now offered by Spang-Chalfant, division of The National Supply Company, it is announced. Oil well tubing and casing can be subjected to pressures up to 10,000 lb per sq in. by new hydrostatic pressure test equipment recently installed at the company's Ambridge, Pa., plant.



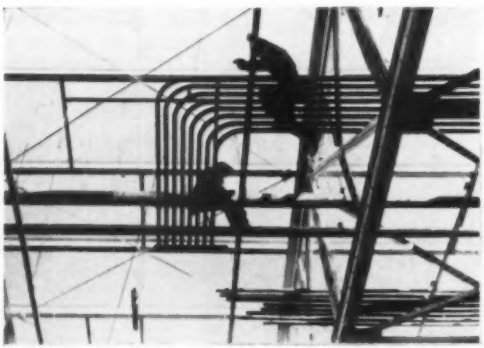
The test bench, built by Hydro-press, Inc., is 86 feet long. Protection for the operator and other workmen near the tester is provided by the enclosure and by elevating doors on both inlet and outlet sides. Interlocking of controls permits pressure in the pipe only when doors are closed and permits loading and unloading only when doors are open.

Pipe enters the test bench on the operator's side, after rolling against adjustable stops that permit lifting one pipe until it rolls into V-blocks on six pre-spaced clamping carriages. Clamps on the carriage close, permitting air cylinders to pull the pipe into position, then a switch is tripped to close other carriage clamps and the enclosure doors.

Pressure is normally held five seconds before release. Valves are then opened, the main ram returned, and the clamps released. The doors are opened, the pipe drains, and is removed from the bench by kick-out arms on each carriage.

Building Heated by 75-Mile Radiator Hung on Ceiling

Designing a heating system for Buick Motor Division's new Building 36 at Flint, Michigan, presented an unusual problem, since metal machining operations to be performed in the building would involve the vaporization of cutting oils. This process would deposit oil and dust on unit heaters, causing an almost immediate drop in heat output and eventually requiring a cleaning that would interfere with production.



As the solution, the engineers specified an overhead heating system of exposed pipes. The system consists of parallel runs of wrought iron pipe, supplied by the A. M. Byers Co., totaling more than 75 miles in length, through which hot water is circulated. In effect, the parallel runs make up a giant ceiling-hung radiator, in a building measuring 700 by 1200 ft, covering more than 19 acres.

The coil water temperature is manually controlled from another building, where an indicator records outside temperature, as well as heat exchanger inlet and outlet temperature. The heat exchanger outlet temperature is varied inversely with the outside temperature according to a linear chart relationship. The size of the piping limits the water temperature to 200 F with the steam valve full open.

This modern plant is heated with modern REVOLVING Unit Heaters

The Crawfordsville, Indiana plant of Raybestos-Manhattan, Inc., one of the country's leading manufacturers of asbestos and rubber products is an example of a modern carefully planned industrial building, laid out for highest efficiency in manufacturing. Typical of the equipment selected with this end in view are the Wing Revolving Unit Heaters. These heaters, by distributing the heated air downwards in a constantly changing direction, keep the workers comfortably warm and invigorated, without subjecting them to constant blasts of hot air or chilly drafts. Wing Revolving Unit Heaters are worth a great deal from the standpoint of employee relations alone.

The discharge outlets of the Wing Revolving Unit Heaters revolve slowly, distributing the heated air downwards in gently moving streams, that can be adjusted for different shapes of areas to be covered. In the summer time, with the heat turned off they act as a perfect air cooling system.

Wing

REVOLVING UNIT HEATERS

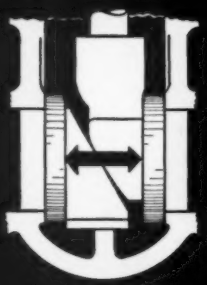
L. J. Wing Mfg. Co. 177 Vreeland Mills Road, Linden, N.J.

Factories, Linden, N.J. and Montreal, Canada
In Europe: Etablissements WANSON, Haren-Nord, Brussels, Belgium

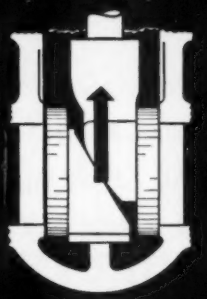
Look how you gain LONGER, TROUBLE-FREE VALVE LIFE

with Darling revolving disc gate valves*

DESCENDING. Fully revolving discs, independently hung, change seating position at each closing, assuring uniform wear distribution for prolonged service. Plain "no pocket" discs are interchangeable for *extra* life!



CLOSED. Faces of upper wedge are radiused and faces of both wedges are transversely beveled for equalized wedging pressure and *tight closing despite valve body distortion.*



RISING. Wedging pressure on both discs is released before discs start to rise. Complete absence of wedging pressure during travel of discs assures easy operation, tight closing and greatly prolonged valve life!

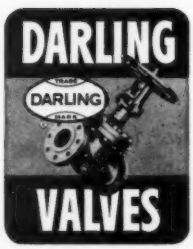
***DARLING REVOLVING DISC GATE VALVES FOR EVERY NEED . . .**

These unique valves are available in iron, bronze, steel, special corrosion-resistant alloys and combinations, and in a broad range of sizes, for all kinds of normal and unusual services in pressures up to 1500 pounds. Before you buy gate valves of *any* type, find out what you stand to gain by using the proper Darling valves. Simply outline your service requirements and ask for a free, descriptive bulletin.

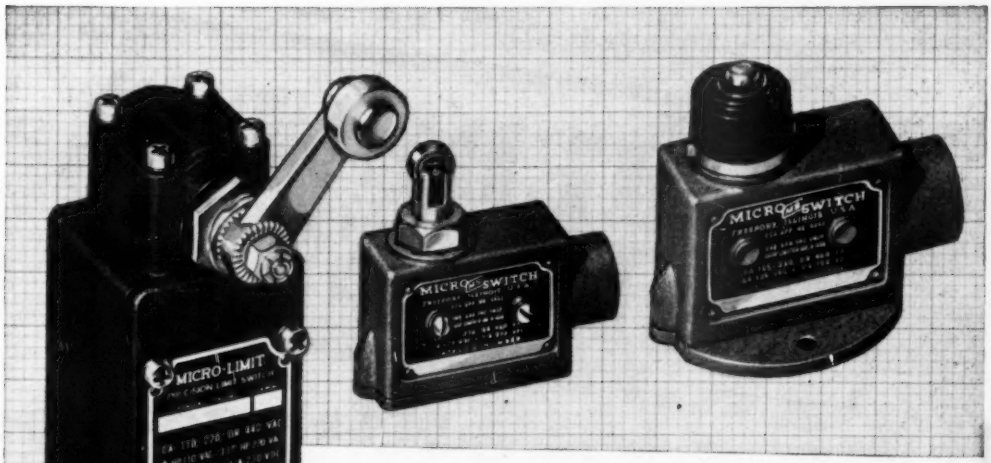
DARLING VALVE & MANUFACTURING CO.

Williamsport 14, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario.



FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN



There's a MICRO Precision Switch to meet every plant application requirement.

Plant engineers charged with keeping present plant equipment safe, automatic and at high production capacity, find in MICRO precision switches a wide variety of switches to meet their needs.

The MICRO line of precise snap-action switches includes heavy-duty limit switches, explosion proof and splash proof switches, high capacity switches to handle high in-rush currents, sealed plunger switches and small die-cast enclosed switches. All are available with plunger actuators, roller-plunger actuators and with roller-arm actuators. Many have both right- and left-hand mounting arrangements and may be side or bottom mounted.

MICRO SWITCH distributors are located in over a hundred key cities to supply just the right MICRO unit to meet your specific plant application need. Look for them in your classified phone book under "Switches, Electric."

MICRO MS SWITCH

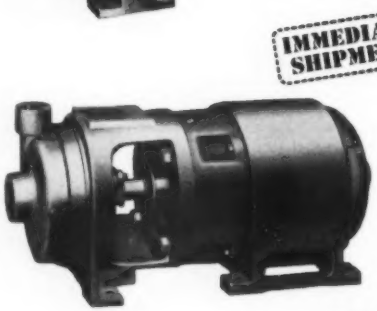
FREEPORT, ILLINOIS

MICRO Snap-Action Switches . . . Honeywell Mercury Switches

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

IMMEDIATE SHIPMENT

...OF I-R MOTORPUMPS



No delay in putting these advantages to work in your plant, *NOW*

LONG, TROUBLE-FREE LIFE: Designed and built by specialists in the field, Ingersoll-Rand Motorpumps have proved their ability to stand up under severe service. You can put these rugged pumps in and forget them!

EASY INSTALLATION: Operate equally well in any position. Easily bolted to floor, wall or other equipment. No special foundations needed!

MAXIMUM EFFICIENCY: Exclusive design features result in pumps that are tops in efficiency when compared size for size with any type industrial pump available today.

LOW FIRST COST: You can often use a more efficient, *lower hp* Ingersoll-Rand Motorpump to do the job. You save on first cost, weight, space and power consumption.

Available in sizes from ¼ to 50 hp. Capacities from 10 to 1800 g.p.m. Heads up to 650 ft.

MOTORPUMP 780-9

To keep vital production up these days, contact us for complete data or help on any of your pumping problems

Ingersoll-Rand
Cameron Pump Division
11 Broadway, New York 4, N. Y.

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

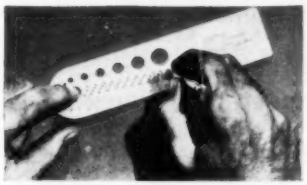
NEW PRODUCTS

(Begins on page 106)

any position relative to the throttle by simply loosening a nut. Inside its slim aluminum alloy housing is a powerful air motor designed for high power in relation to air consumption, as well as efficient operation at low pressure. A built-in regulator allows for variable speed ranges and lubrication is accomplished by a built-in automatic oiler. Two styles are available: the Model PD-A-308L, lever throttle angle head, or Model PD-A-308B, button throttle. An illustrated bulletin with specifications on this pneumatic angle head drill is available. Mall Tool Co.

8—ENGINEER'S FRIEND helps out on a lot of jobs

The Circ-L-Scale is a small, plastic device approved by the American Society of Industrial Engineers and dedicated to a life of usefulness. It serves as a combination compass, scale, square,



protractor and lettering guide—and on its reverse side are decimal equivalents, temperature table, tap and drill scale and metric rule.

The handy little Circ-L-Scale is made of durable vinylite because of its low coefficient of expansion. It's offered free of charge to qualified plant engineers. Unistrut Products Co.

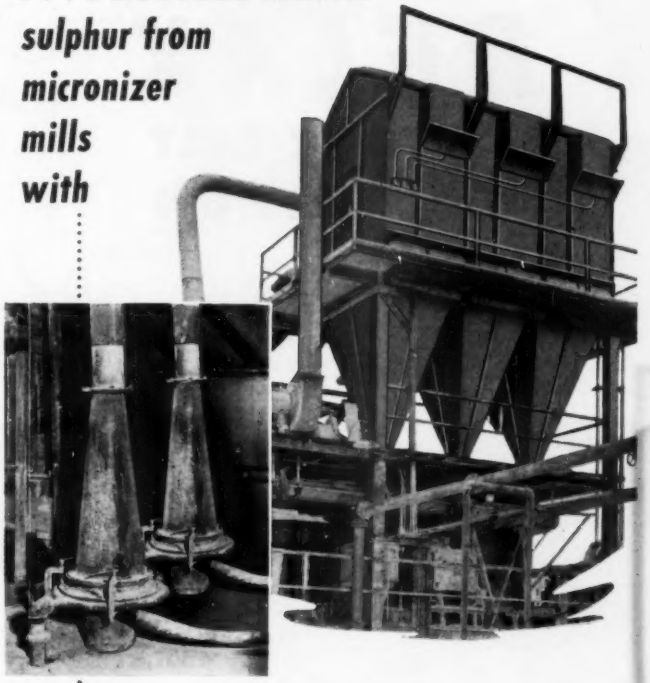
9—3-TON FORK LIFTS are diesel or gasoline powered

The first 6000-lb capacity fork lift trucks to be manufactured by this company, these are rated at a 24-in. load center and available with a choice of two gasoline or diesel engines. Model FT60-24 is powered with a 73½ hp, six-cylinder gasoline engine and is available as optional equipment with a four-cylinder, 53 hp engine. A six-cylinder diesel engine with a 230 cu in. displacement is standard for Model FTD60-24 with an optional four-cylinder 182 cu in. displacement diesel. A 72-, 84-, 108-, 114- or 120-in. lift is standard on both models. The Buda Co.

10—HUMIDITY CONTROL for process or comfort uses

Two-position or proportioning, humidifying or dehumidifying, this new electronic humidity control is designed for super-sensitive, instant response with plug-in element, wide range and simple adjustments. According to manufacturer, its moisture-sensitive element changes resistance instantly with min-

. . . . DUSTUBE collects sulphur from micronizer mills with



Superior Overall Performance

Collecting sulphur after it has been reduced to particle size of less than four microns requires a dust collector that can stand up under repeated inherent processing explosions. For this application at the Micronized Products Department of Corona Chemical Division, Pittsburgh Plate Glass Company, a Dustube Collector, with special explosion relief features designed to Pittsburgh specifications, was selected because of superior overall performance. It withstands the explosions without damage to the system and then resumes operation quickly.

Serving both as a materials handling and recovery unit, the Dustube collects Corona Micronized Wettable Sulphur and Dusting Sulphur from micronizer mills and feeds it by gravity to the packing department. None of the valuable fungicide material is lost.

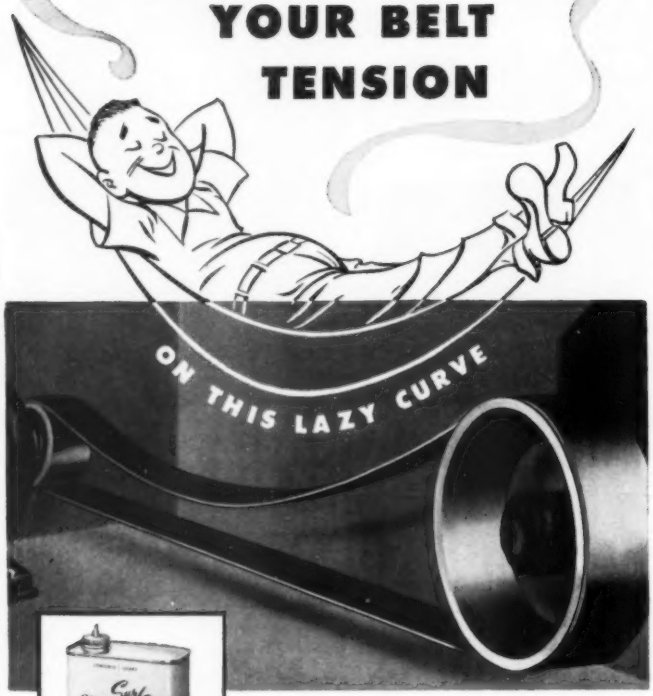
The Dustube has an unusual flexibility in handling dust, fume and material in all types of chemical processes. Be sure to include it for comparison in any investigation you make of dust and fume collecting equipment. Send also for new Catalog No. 72-B.

American dustube COLLECTORS

OFFICES IN PRINCIPAL CITIES

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 839 S. Byrkit St., Mishawaka, Ind.

RELAX
YOUR BELT TENSION



CLING-SURFACE

MAKES BELTS
1. WORK BETTER
2. LAST LONGER
3. SAVE POWER

Cling-Surface adds "grip" to your transmission belts, stops slipping and permits trouble-free, economical, "slack belt" operation as shown above.

Tight belts stretch under constant tension and require frequent "take-ups"; they increase the friction load, waste up to 50% of your power and needlessly strain your bearings and shafting.

Easy-to-apply, Cling-Surface is the ONLY belt preservative that meets U.S. Government requirements and is the ONLY brand that DARES to recommend "slack belt" operation. GIVE IT A TRIAL AT NO RISK. Any belt properly treated with Cling-Surface may be operated "slack". If you don't agree that this method practically eliminates down time for belt repairs, makes your belts, bearings and shafting last longer and delivers more power to your machines, we'll GIVE YOU BACK YOUR MONEY. We've been making this offer since 1896! Ask your mill supply man or,

SEND FOR THIS FREE BOOK
"THE TRUTH ABOUT ALL BELT DRESSINGS"

CLING-SURFACE CO. 1048 NIAGARA STREET BUFFALO 13, NEW YORK

NEW PRODUCTS

(Begins on page 106)

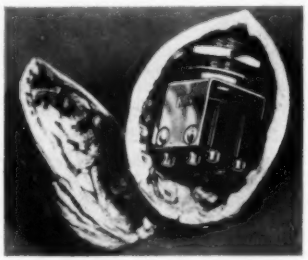
ute changes in relative humidity. In spaces supplied by a central fan, the sensing element is mounted either in the duct or the conditioned space, remote from amplifier and adjustments. For controlling relative humidity in spaces not completely air conditioned, the aspirating type control is available with operating adjustment mechanisms in a cabinet. Barber-Colman Co.

11—WAREHOUSE TRAILER has steel plate deck 8-in. high

The Lo-Deck Trailer is designed to overcome certain disadvantages of the standard 14-in. high deck trailer in warehouses and other places where heavy crates, machinery, barrels are hauled on trailers. In such applications the lower deck can mean less labor in loading and greater safety to workmen. Although its deck is only 8 in. high, the automatic couplers are at standard height, so the Lo-Deck can be used in a trailer train along with standard warehouse trailers. Load capacity is 6000 lb; deck size is 36 by 72 in. Thomas Truck & Caster Co.

12—ELECTRIC SWITCH is compact, push-button type

Subminiature Switch ISMI is announced as weatherproof and oilproof and so small that the double-throw, double-pole assembly will fit inside a walnut shell. The panel-mounted push



button is sealed against oil, water and dirt by synthetic sponge rubber and the small movement required to operate this snap-acting switch is provided by the resilience of the seal.

Single- and double-pole switch assemblies for 5 amp, 250 v a-c are available and either type is designed to control 30 v d-c inductive loads of 2 amp at sea level or 1½ amp at 50,000 ft elevation. Data Sheet 60 gives further information. Micro Switch.

13—BUTTERFLY VALVE is pneumatically operated control

This air operated valve is designed for control of air, water or steam flow. The pneumatic valve motor is described as a Grad-U-Motor power unit and operates on a controlled air pressure range of zero to 15 psi. Adjustable mechan-

the case of Clumsy Clara

Poor Clara! Personnel said she had good dexterity . . . would make a good assembler But her work didn't show it. Rejections were way high She seemed to be all thumbs . . . collected a lot of splinters, too

Then came the big change . . . to work surfaces of Tempered Presdwood® Big change in Clara, too. First-rate assembler now. Almost no rejections No more splinters, either

Nobody worries about splinters or rough spots on work surfaces when hard, smooth Masonite Tempered Presdwood is on the job. It's tough! Takes all kinds of slam-bang treatment. Easy to install and easy to keep clean.

Tempered Presdwood permits high color contrast with work in process. For light colored parts it can be left in natural dark brown shade. For darker materials, use soft pastel tints. Presdwood offers an excellent base for surface finishes . . . this versatile hardboard has no grain to rise and disturb the finish.

There are dozens of uses around your plant for Tempered Presdwood. Building materials dealers stock 23 types and thicknesses of all-wood Masonite Presdwood. Send the coupon now for complete information.

BETTER HARDBOARDS FOR BETTER MAINTENANCE

MASONITE® CORPORATION

"Masonite" signifies that Masonite Corporation is the source of the product

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Dept. PE-8, Box 777, Chicago 90, Ill.

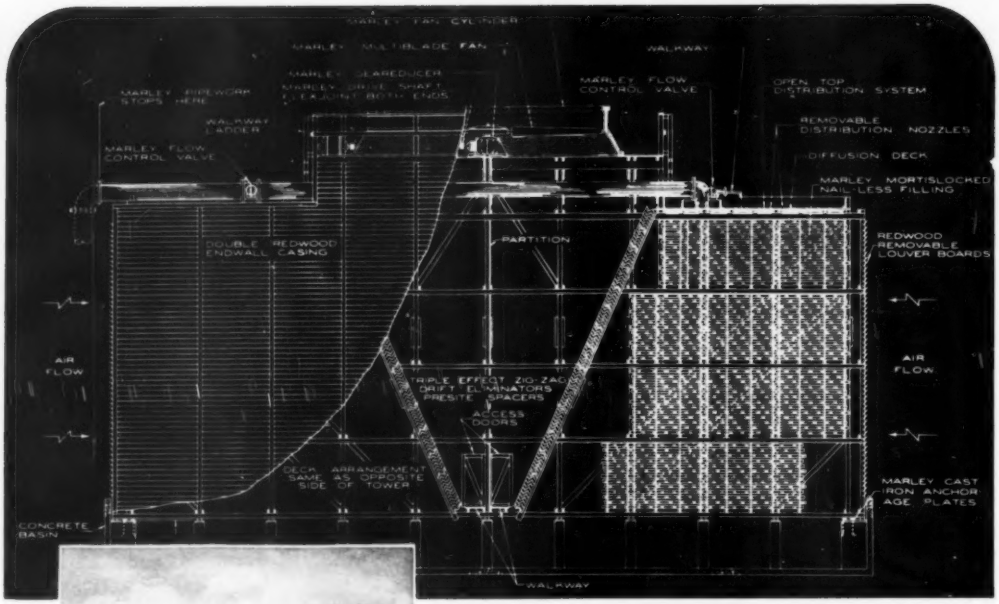
Yes! I'd like to know more about Masonite Presdwood and where we can use it around the plant.

Name . . . . . .

Company . . . . . .

Address . . . . . .

City and Zone . . . . . State . . . . . .



for DESIGN and PERFORMANCE

Engineers who know, choose MARLEY Double-Flow

Marley Double-Flows cool 13 billion gallons of water daily . . . more than any other type of tower. The reason why Double-Flows are the outstanding choice of engineers for industrial service is the combination of exclusive features only Double-Flow offers.

Such distinctive design features as open distribution, full height louver walls, MortisLocked filling, rugged structural strength and mechanical equipment engineered exclusively for cooling tower service are the advantages engineers demand and find only in Double-Flows.

These features mean high efficiency performance . . . unique flexibility of operation . . . complete accessibility of all parts of the tower . . . safety for operators . . . inspection and maintenance with least possible effort.

Repeat orders are the best criterion of performance for cooling towers, and in industry after industry multiple installations of Double-Flow cooling towers are the dominant rule. Many plants use from two to ten or more Double-Flows and in one industrial organization, 33 of these modern cooling towers are in daily service.

producers of

DOUBLE FLOW TOWERS
DRICOOLERS
AQUATOWERS
NATURAL DRAFT TOWERS
CONVENTIONAL TOWERS
SPRAY NOZZLES
DOUBLE FLOW AQUATOWERS

MARLEY

The Marley Company, Inc.

KANSAS CITY 5, MISSOURI

NEW PRODUCTS

(Begins on page 106)

ical stops are provided on the motor to enable wing rotation to be limited for special applications.

This valve is sized from 1½ to 6 in., with screwed connections. Body, wing and trim are bronze. Maximum operating temperature is 250 F, maximum pressure, 20 psi. Industrial Div., Minneapolis-Honeywell Regulator Co.

14—CONVEYOR BELTING has non-skid surface

Handling materials on inclines as steep as 42 deg is the performance record claimed for Safety-Grip Rough Top Conveyor Belting. Constructed with thousands of fingerlike rubber tentacles

that grip and hold slippery materials, this belting is suggested for carrying wax-surface cartons, ice, tin plate, glass, tile etc. up steep inclines without slipping. It flexes over minimum diameters easily. Pulleys of 2 in. per ply are recommended, although smaller diameters have been used satisfactorily, says company.

The belt construction is usually 3 plies of duck and minimum of 3/32 in. top cover thickness by friction bottom surface. Quaker Rubber Corp., H. K. Porter Co., Inc.

15—ELECTRIC DRIVE has double reduction gears

Larger, totally enclosed fan-cooled geared motors have been added to this company's line of Slo-Speed Electric Power Drives. These new units are double reduction and available with Class I, II and III gears in frame size 364/365 and AGMA speed 155 rpm and slower in ratings from 5 to 25 hp.

In this drive bearings are mounted in the outer walls of the gear case and gears are mounted between these widely spaced bearings to permit use of offset shafts and provide permanent bearing and gear alignment in uniform distribution of load. Sterling Electric Motors, Inc.

16—AIR CONTROL VALVE is for hazardous operations

A special valve in this manufacturer's Pilot-Master line is the Series B-3, a three-way solenoid valve designed to "fail safe" under all conditions. Its principal use is expected to be for the control of clutch and brake cylinders

Have you discovered these

Hidden Values

in Red-Strand wire rope?

You get 3 important, unseen values in Hercules *Red-Strand*.

The first is *extra endurance*.

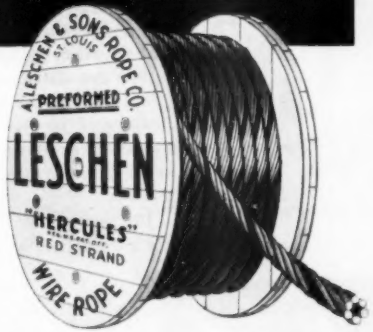
The second is *consistently high performance*.

The third is complete *dependability*.

These values are made possible by Leschen's exacting insistence upon *higher-than-rated* quality . . . by precise, specialized manufacturing craftsmanship . . . and by the constant use of only the finest known grade of steel for long-lasting Hercules *Red-Strand* wire rope.

Service records prove these hidden values. Your records will too.

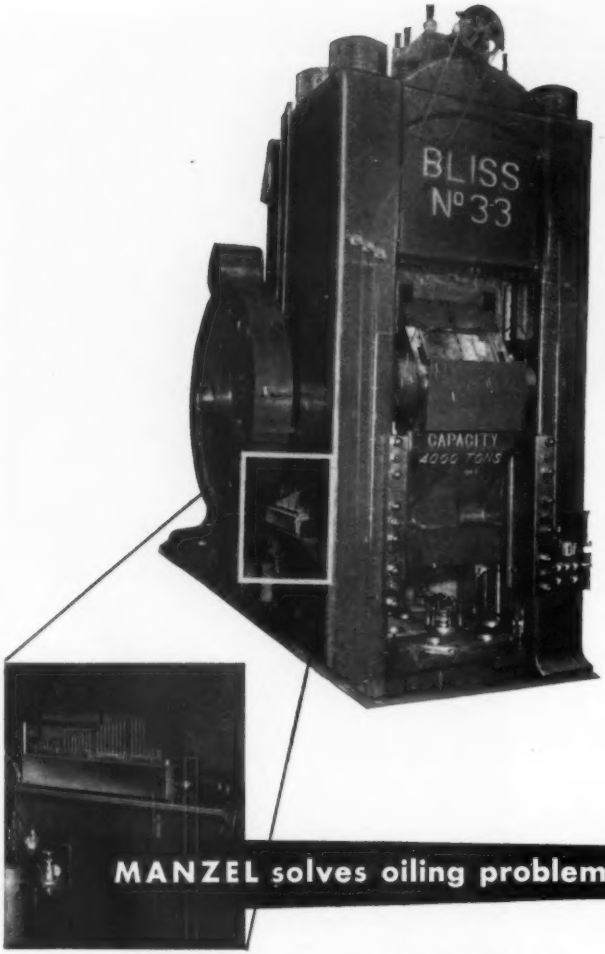
Higher operating profits may be yours with Hercules *Red-Strand* wire rope. Talk it over with your Leschen wire rope specialist . . . before you place your next rope order. Or, write for bulletin.



A. Leschen & Sons Rope Co., St. Louis 12, Missouri

In business only to make wire rope — better wire rope — since 1857.

DISTRIBUTORS IN ALL PRINCIPAL CITIES



MANZEL solves oiling problems

Manzel lubricates Bliss Press. What's your problem?

Insure many years of economical, trouble-free service from all types of machinery with *Manzel* Force Feed Lubrication. Adaptable to numerous difficult oiling problems, "Manzel's" can be engineered to *your* requirements. Experienced representatives throughout the country.

Just write . . .

Manzel

301 Babcock Street Buffalo 10, N. Y.

NEW PRODUCTS

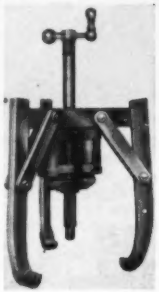
(Begins on page 106)

on mechanical presses, where failure of a valve to reverse when the solenoid is de-energized might result in injury to the operator.

The valve is described as a completely springless assembly in which both "pilot" and "master" valves are automatically returned to the "normal" or inoperative position by air pressure the instant the solenoid is de-energized. Since retained air in the brake and clutch cylinders of the press would have sufficient pressure to operate the valve, even in the case of a serious leak in the air line, there is no situation in which the press would not be stopped, company points out. Hannifin Corp.

17—3-WAY PULLER is adapted to hydraulic power

This company's popular Power-Twin Hydraulic Puller has now been adapted for use with three-arm pullers to greatly speed up those difficult pulling



jobs requiring a three-arm puller. Plants already having the Power Twin Ram and company's three-arm Grip-O-Matic Puller need only purchase a special three-way head to convert the puller to hydraulic power. Three new heads are available for corresponding sizes of pullers. Owatonna Tool Co.

18—FORK TRUCK with magnetic personality

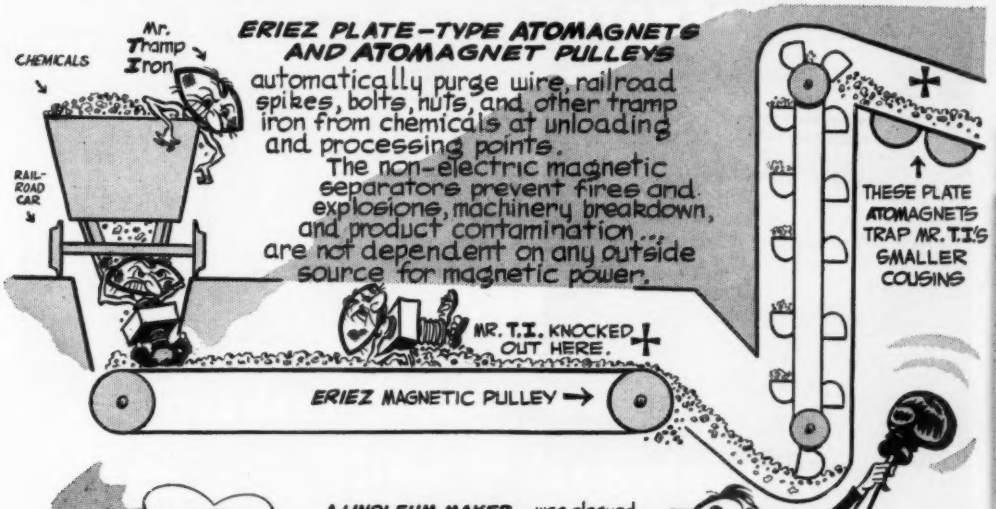
Speed, direction and braking are accomplished with one master control lever in the new Spacemaster Electric Fork Trucks. The operator has a choice of four speeds forward or reverse and with the incorporation of magnetic controls he can throw the master control lever into full speed forward and get a smooth, automatically timed acceleration through each speed. However, any speed can be selected, and the truck can run at that speed.

The operator can go from full (or any) speed forward to full (or any) speed reverse with a flick of the lever, company says, and deceleration forward through neutral and into acceleration reverse are all controlled by magnetic timing.

Another feature announced for the trucks is dynamic braking—the oper-

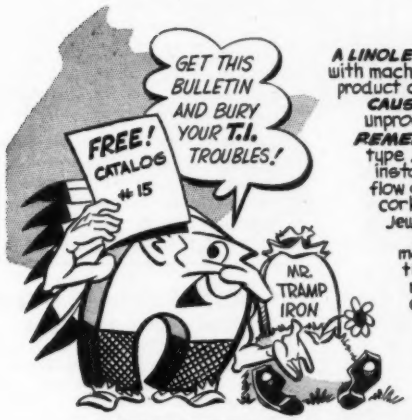
ERIEZ MAGNETIC ATTRACTIONS

ERIEZ MANUFACTURING CO., ERIE, PA., U.S.A. • PRODUCERS OF MAGNETIC SEPARATORS



ERIEZ PLATE-TYPE ATOMAGNETS AND ATOMAGNET PULLEYS automatically purge wire, railroad spikes, bolts, nuts, and other tramp iron from chemicals at unloading and processing points.

The non-electric magnetic separators prevent fires and explosions, machinery breakdown, and product contamination... are not dependent on any outside source for magnetic power.



A LINOLEUM MAKER... was plagued with machinery damage, fires and product contamination.
CAUSE: Tramp Iron in unprocessed cork...
REMEDY: ERIEZ plate-type **ATOM**agnets installed in gravity flow chutes before cork enters Ball & Jewell grinders...
RESULTS: No machinery down-time... no fires.. no product contamination!

HOW TO PROTECT CHEMICALS WITH MAGNETS. This is one of the subjects treated in a new bulletin offered by **ERIEZ** Manufacturing Company. It is complete with descriptions and installation drawings of all **ERIEZ** magnetic equipment for the chemical industry.

If you are troubled with tramp iron, this brochure will tell you how to catch it and save money.

Use coupon at right

ERIEZ Manufacturing Company, 204 State Street, Erie, Pa.

My Contamination or Separation Problem is: _____

_____

Please Send Me the *FREE CATALOG # 15*

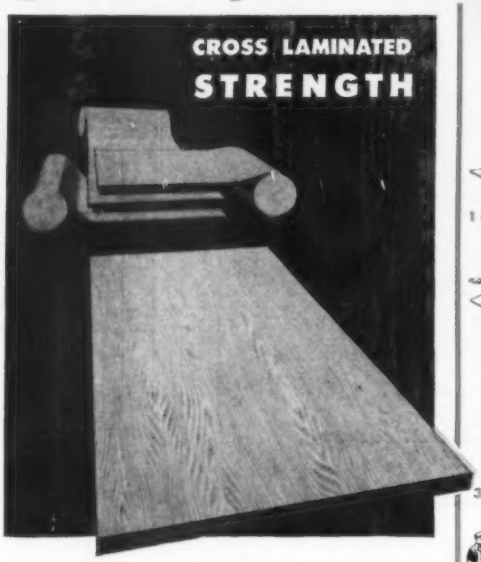
Name _____ Title _____

Company Name _____

Street _____

City _____ Zone _____ State _____ 52H

Only plywood gives you all 6



1 Cross Laminated Strength

2 Workability

3 Attractive Appearance

4 Large Panel Size

5 Tested Quality

6 Light Weight

POUND FOR POUND, Douglas fir plywood is one of the strongest of all building materials. It's *real wood*, cross-laminated to distribute wood's great along-the-grain strength in *both* directions. It's tough, durable, split-proof, puncture-proof. Won't crack, chip, break or shatter. Shrugs off blows that would tear, dent or split other heavier, bulkier materials.

If you have a building, remodeling or manufacturing job where light-weight strength, workability and work-speeding size pay off, plan it with plywood. For detailed information about plywood uses and properties, write Douglas Fir Plywood Association, Dept. 478, Tacoma 2, Washington.

Douglas fir plywood is real wood, made by "unwinding" giant logs
into thin wood sheets which are inseparably cross-laminated
to form large, light panels having beauty and great strength

Douglas Fir Plywood
AMERICA'S BUSIEST BUILDING AND INDUSTRIAL MATERIAL

NEW PRODUCTS

(Begins on page 106)

ator can decelerate and stop his truck without using his mechanical brake. Dynamic braking is accomplished via the master control lever in the driver's hand. Lewis-Shepard Products.

19—OVER-UNDER SCALES for check-weighing

Available in three capacities—Model 3011 to 5 lb, Model 3021 to 20 lb, and Model 3031 to 50 lb, these new Speedweigh Scales offer easy reading, modern appearance and new construction features, in addition to a full selection of scoops and platters.

An acrylic plastic dome on the chart housing admits light from both sides,

and the charts have black figures on a yellow ground. Indications are on both sides, so charts can be read from front or back. The indicator travels an inch to the ounce.

Among the construction features announced is a stainless steel beam which permits weighing up to capacity without extra weights. Toledo Scale Co.

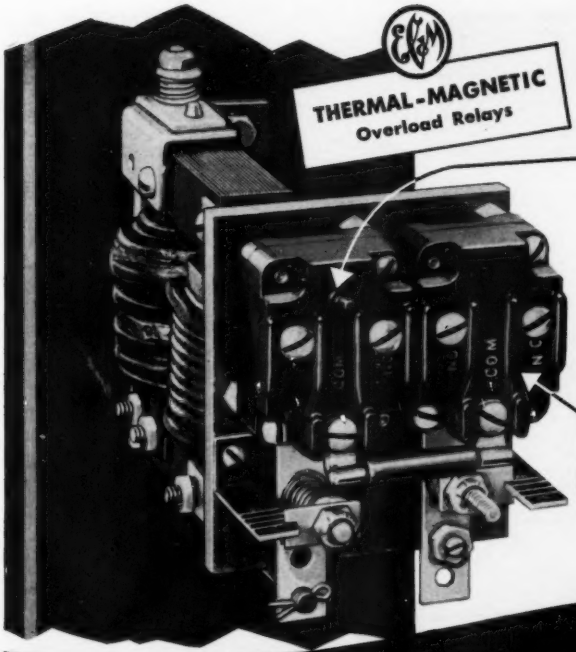
Further details on any product are available without cost or obligation. List item numbers on the postage-free cards on pages 35-36, 133-134.

20—PROTECTIVE RELAY is slow speed overcurrent type

The new Type CO Relay, with "inverse" or "very inverse" time characteristics, is intended principally for protection of transmission and distribution lines and available in one of three ranges—0.5 to 2.5 amp, 2 to 6 amp, 4 to 12 amp. Accuracy, flexibility and reliability are most important features announced for the Type CO.

Accurate timing is provided by adjustable magnetic plugs in the newly designed E element electromagnet, and accurate pick-up at tap value of current for all disc positions is provided by two independent adjustments. Adjustment of damping torque can be made by a keeper screw.

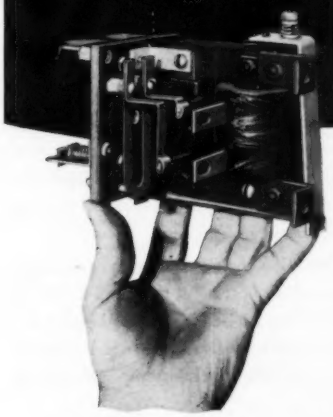
The relay can be changed in the



THIS CONTACT OPENS ON A **SHORT**

THIS CONTACT OPENS ON AN **OVERLOAD**

Independent *trips* save electrician's time in locating trouble



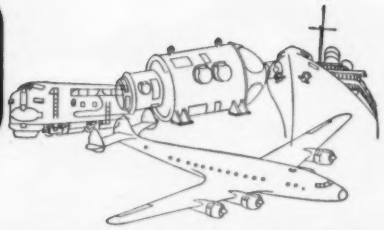
¾ rear view shows independent thermal and magnetic tripping elements—both are adjustable. Relay is front-connected, removable as a unit from the mounting-base.

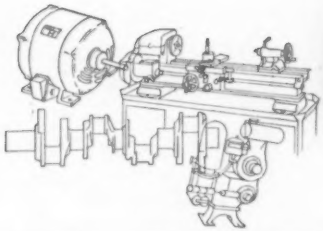
When a motor stops, the electrician soon finds whether an *over-current* or a *fault* has caused the shutdown. EC&M THERMAL-MAGNETIC Overload Relays have independent thermal and instantaneous tripping elements operated from *one magnetic source*. Contacts are also independent with the instantaneous-element regularly furnished with hand-reset contacts. A quick look distinguishes between wiring trouble and motor overloading—*cuts downtime up to half*.

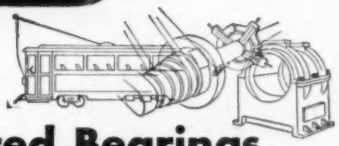
EC&M Type ZTM Overload Relays combine the *proven advantages* of *Thermal* and *Magnetic* tripping characteristics for complete a-c motor protection . . . increased life of motor insulation—elimination of useless tripping on harmless temporary overloads—minimized damage on faults. For certain enclosed motors with no inbuilt overload capacity, these relays are set to operate from 90% to 110% full load motor current to safeguard non-stop operation.

WRITE TODAY FOR NEW BULLETIN 1180-334

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO







How to Maintain Babbitted Bearings

Use Federated's "Big 3" Babbitts . . . a team of varied babbitts which answers 90% of all white metal bearing maintenance needs.

XXXX Nickel* is suited for almost any job that demands a tough tin-base bearing alloy . . . for high loads at high speeds.

Merit Metal* is a dense, compact, durable lead-base anti-friction alloy for bearings carrying moderate loads at moderate speeds.

Frictionless* is a world-famous lead-base alloy specifically designed for bearings that operate under low loads and at low speeds.

With Federated's "Big 3" Babbitts you can re-line virtually any bearing . . . keep machines going!

Send for Federated's new booklet "Hints on Babbitting Practice." It outlines basic steps for the prevention of common bearing failures, and covers everything from the choice of metal for a particular bearing application through the correct pouring practice to maintenance in service.

Proper lubrication, a strict maintenance schedule, and operation of the bearing at the speed for which it was designed are advised for longer bearing life and reduced maintenance costs. This and other information on babbitted bearings is contained in the booklet.

**Tradename of American Smelting and Refining Company*

For white bearing metals think of the "Big 3" . . for any non-ferrous metal or alloy think of Federated. For Bulletin No. 146 on Babbitting Practice, write Department PE.

Federated Metals Division

AMERICAN SMELTING AND REFINING COMPANY • 120 BROADWAY, NEW YORK 5, N. Y.

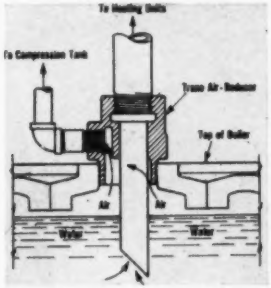
NEW PRODUCTS

(Begins on page 106)

plant from one time characteristic to the other, and is mechanically and electrically interchangeable with company's previous CO Relay. It is available with standard projection or Flexitest case. Westinghouse Electric Corp.

21—AIR REDUCER is for removing air at the boiler

An easily installed fitting, the Air-Reducer is designed to eliminate two adapter connections and thus permit an easier, faster and more economical boiler installation. It is, in effect, a pipe within a pipe. The brass inner tube extends the hot water system's

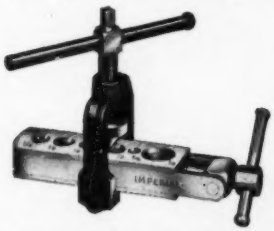


supply main below the surface of the water in the boiler to prevent air from entering piping and heating units. Air collecting at the top of the boiler is bled off to the compression tank.

Further installation economies are reported gained through incorporating the boiler reducing bushing into the fitting, and through eliminating a nipple by fitting the Air-Reducer directly to the boiler. The device is made for boiler and main sizes from 1 by 1½ to 3 by 4 in. The Trane Co.

22—FLARING TOOLS for making 37 deg flares in tubing

Designed for flaring soft steel, copper, aluminum and fully annealed stainless steel tubing, these two new tools make



37 deg flares which conform to JIC standards, manufacturer reports. An outstanding feature of the new units is the wide range of tubing sizes that can be flared. The No. 437-F flares six sizes from 3/16 to ⅝ in. OD. The other, No. 537-F flares four sizes from ¾ to 1¼ in. OD and has rollers in the flaring cone which facilitate flaring of larger sizes, as well as an automatic burnishing mechanism which provides a polished finish to the face of the flare.

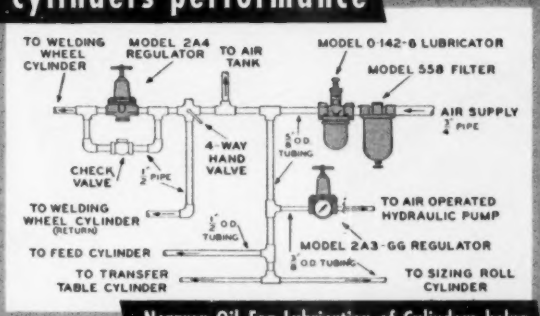
The tools have a new type of die holder with sliding dies for clamping the tubing. The yoke of the tool slides over the end of the die holder into position over the tubing to be flared, making it possible to operate the tool with speed. Bulletin 3004 describes the tools. The Imperial Brass Mfg. Co.

23—INDUCTOR for non-self-priming centrifugal pumps

Designed for priming of pumping systems where pump is above water level, this inductor is said to perform satisfactorily with pumps handling ashes and sand as well as clear liquids. Basically it is a water-operated jet, its purpose being to fill the entrance pipe and pump with liquid.

The inductor requires only a clear liquid service pipe. A service liquid supply of sufficient capacity and pressure must be piped to it, but ordinary city water is usually suitable. Priming takes just a few seconds, manufacturer says, and the inductor does not retard suction after priming is effected. Units are available for use with company's centrifugal pumps which are not self-priming, and for other makes of horizontal shaft pumps. Literature furnished on request. Nagle Pumps, Inc.

NORGREN improves air cylinders performance



Norgren Oil Fog Lubrication of Cylinders helps National Welder attain 1000-per-hour Output

PLANT REPORT
NATIONAL ELECTRIC WELDING MACHINES CO.

PROBLEM:
To provide positive, trouble-free lubrication of 4 air cylinders and one air-operated hydraulic pump for a special 200 KVA Welder which automatically roll-forms, sizes, feeds and mash-seam welds metal containers up to 25" in diameter.

SOLUTION:
Use of Norgren Filter, Regulator and Lubricator system which cleans, regulates and lubricates the air used to power the pneumatic units on the Welder.

RESULT:
The Norgren equipment provided the efficient, dependable lubrication, air regulation and air cleaning required for continuous high speed operation— thus saves time and money for the National Welder users by reducing maintenance and costly down time, and minimizes the amount of servicing by the manufacturer. National Electric Welding Machine Company says: "We have standardized on Norgren air accessories for nineteen years and have found them to be extremely satisfactory."

• Hose Assemblies
• Regulators
• Valves
• Filters

FASTER DELIVERY RESULT OF NEW PLANT FACILITIES

Norgren

3463 S. ELATI ST., ENGLEWOOD, IN COLORFUL COLORADO

C. A. NORGREN CO.
3463 So. Elati—Englewood, Colorado

Gentlemen: Please send me your free Norgren Blueprint No. 115-A, giving complete data on above lubrication system.

Name_____

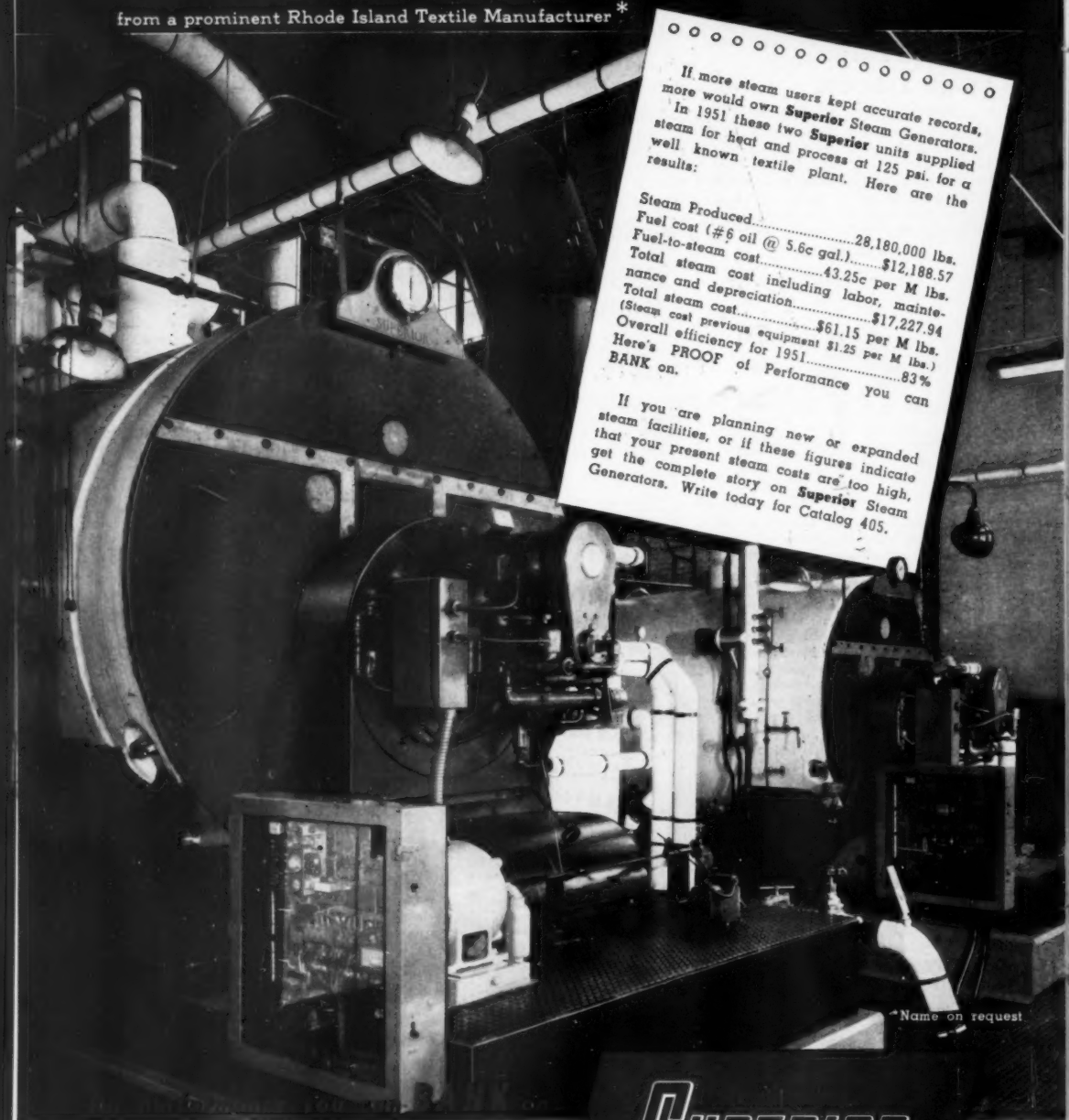
Address_____

Company_____

accept no estimate of economy

LOOK at these STEAM COSTS

from a prominent Rhode Island Textile Manufacturer *



If more steam users kept accurate records, more would own **Superior** Steam Generators.

In 1951 these two **Superior** units supplied steam for heat and process at 125 psi. for a well known textile plant. Here are the results:

Steam Produced	28,180,000 lbs.
Fuel cost (#6 oil @ 5.6c gal.)	$12,188.57
Fuel-to-steam cost	43.25c per M lbs.
Total steam cost including labor, maintenance and depreciation	$17,227.94
Total steam cost	$61.15 per M lbs.
(Steam cost previous equipment $1.25 per M lbs.)	
Overall efficiency for 1951	83%

Here's PROOF of Performance you can BANK on.

If you are planning new or expanded steam facilities, or if these figures indicate that your present steam costs are too high, get the complete story on **Superior** Steam Generators. Write today for Catalog 405.

*Name on request

SUPERIOR STEAM GENERATORS

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 18, N.Y.

(Continued from page 34)

143 **Manometer Manual**—Bulletin 313 is a 12-pp illustrated manual on manometers, providing basic facts and definitions on pressure measurement. Explains how various types of manometers operate and what they measure; gives detailed information on installation, operation and maintenance. English and metric tables of equivalents are given for readings taken with various indicating liquids. King Engineering Corp.

144 **Thermocouple Assemblies** — Catalog EN-52, 44 pp, offers up-to-date information on company's line of thermocouple assemblies and components for general and special use. In a simplified tabular arrangement, lists accuracy limits of couples, temperature and physical limitations and protecting tube materials. Includes handy margin index. Leeds & Northrup Co.

145 **Combustion System Safeguards** — Twelve-pp Bulletin 30-1006 describes two protective devices used in the piping systems of gas-and-air combustion systems: an automatic fire check to detect, localize and extinguish a flashback in the gas-air mixture lines, close to the gas burners; and a safety blowout to prevent flashbacks in main supply piping from damaging control equipment. Selas Corp. of America.

146 **Lookin' for Trouble?** — Here's an illustrated bulletin on the Electro Probe, an improved low-cost electronic trouble spotter, which indicates by noise meter dial and speaker or headphones. Tells of probe's use in locating motor ailments, vibration sources, finding leaks and stoppages. Erwood, Inc.

METALS, CASTINGS

147 **Ferritic Steel Properties**—This 12-pp bulletin gives properties of low carbon 8½ per cent nickel steel that is resistant to the embrittling effects of low temperatures (-320 F) and can be welded and fabricated under somewhat the same conditions as engineering steels. Twenty tables and charts depict mechanical properties, effects of heat treating, welding. The International Nickel Co., Inc.

148 **Ferrous Castings for Abrasion Resistance**—This 24-pp booklet suggests a system for analyzing service conditions and selecting a ferrous alloy with suitable mechanical properties for the job. To aid analysis, tables are included which list properties of various alloys, of minerals commonly worked (gangue and vein) and a number of service tested applications in industries. American Brake Shoe Co.

149 **Steel Castings Chart** — Standard specifications for more than 70 designated classes of steel castings are incorporated in this summary chart. Covers pertinent data on virtually all general engineering types of steel castings, together with recently adopted specifications and some revisions of previous standards. Steel Founders Society of America.

MAGNETIC SEPARATION

150 **Magnetic Protection for Grain Mills**—Brochure B-362, 6 pp, provides details on spout installations and application data on magnetic separators for removing tramp iron from grain and feed, as well as preventing spark-caused fires and protecting machinery from tramp iron damage. The permanent Alnico magnets described can be installed on feed chutes, pellet mills, hammermills, etc. Eriez Mfg. Co.

151 **Magnetic Coolant Separation** — The harnessing of magnetic force to clean coolants used in metal finishing is explained in Bulletin 300B, 12 pp. Design and operating features of company's separators are described and pictured and specifications given for several models ranging in capacity from 1½ to more than 350 gpm. Seven photos show separators in action on shaving machines, grinders. Barnes Drill Co.

MACHINE SHOP EQUIPMENT

152 **Grinding Attachment** — The "61" Port-A-Belt attachment which incorporates manufacturer's "61" contact wheel and is designed to fit almost any portable horizontal grinder, air or electric, is introduced in this bulletin. Discusses easy handling, fast cutting, other advantages, and pictures some of the jobs handled. The Carborundum Co.

153 **Answers to Grinding Problems**—Written to help plant engineers get the most from their flexible shaft grinding equipment and to help solve some common production bottlenecks. 40-pp Catalog 52 offers a wealth of information. General data on grinding provide answers to many grinding questions, tips on selecting and operating flexible shaft grinding machines. Describes and pictures manufacturer's line of grinders, spindles, attachments, rotary files and burrs. Mall Tool Co.

154 **Centralized Mass Lubrication** — Eight-pp Form 1-2854 describes and pictures some typical applications of company's centralized mass lubrication systems, citing savings afforded in terms of man-hours, machine-hours, materials and power. Presents automatic, semi-automatic and manually controlled systems, as well as fittings. Lincoln Engineering Co.

PUMPS, PUMPING

155 **Controlled Volume Pumps**—Bulletin 531, 16-pp, describes company's air-powered controlled volume pumps, designed to pump practically any liquid in measured volumes accurate to within a fraction of 1 per cent. Pumps are reciprocating, positive displacement plunger types. Cross-sectionals show design and operating details. Milton Roy Co.

156 **Centrifugal Pumps**—A line of non-clogging centrifugal pumps for dairy, food processing, chemical and general industrial use is presented in 20-pp Catalog 250. Explains and pictures design details and gives dimensions and parts list for several sanitary type and light- and heavy-duty industrial types. Includes helpful data on viscosity of fluids, loss of head, methods of figuring head, suction and discharge piping. Tri-Clover Machine Co.

157 **Proportioning Pumps**—Catalog Up-52, 24 pp, gives full information on a line of mechanical drive U-type metering and proportioning pumps. Full specifications and prices are included, plus a section on selection. This data makes it possible to specify exact pump for any of 300 listed substances handled. Hills-McCanna Co.

HEATING, COOLING

158 **Hot Water Heating**—This company's hot water heating products are thoroughly treated in recently revised bulletin T-1941, 8 pp, with special attention given to a new air-reducer described as an easily installed fitting for removing air at the boiler. Also discussed are layout and design data for a one-pipe hot water system. Piping details and roughing-in dimensions are included. Trane Co.

159 **Gas-Fired Unit Heaters**—Catalog 886 describes and illustrates a new line of five gas-fired unit heaters with welded steel

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heat exchangers. Shows essential components, cutaway and other illustrations of the new heaters which have input ranges from 55,000 to 200,000 Btu per hour. Construction features are listed and ratings, dimensions and roughing-in data included. National Radiator Co.

160 **Heating, Cooling Equipment**—This newly-released 8-pp bulletin is a concise picture-book presentation of some of manufacturer's heaters, coolers, condensers and heat exchangers for all types of liquids, vapors and gases. The Griscom-Russell Co.

161 **Instantaneous Heaters**—Besides explaining construction features which contribute to the efficiency of manufacturer's instantaneous heaters (two-, four- and six-pass hot water units) and how to select them, Bulletin 35-78 devotes 40 of its 52 pp to tabular material on capacities and pressure drops for 100 heaters. These cover 12 temperature ranges and nine steam pressures from 0 to 100 lb. Provides a dimension-weight-price table. American District Steam Co., Inc.

162 **Cooling Towers** — Stressing lower erection and operating costs, greater structural strength, high efficiency of company's TF cooling towers, this 20-pp booklet describes and illustrates construction features which contribute to these factors. Hudson Engineering Corp.

DUST CONTROL

163 **Dust Control Brochure**—Dust and fume control in many industries is the subject of this comprehensive 24-pp booklet. Tells how cloth-tube type dust collectors are handling complex problems in 32 typical installations, all illustrated. Covers use of these collectors in chemical processing, coal cleaning, sewage disposal, many other applications. American Wheelabrator & Equipment Corp.

164 **Dust Control Developments**—Vol. 1, No. 1 of "Dust and Fume Topics" is the first issue of a news publication telling how company's Dustube cloth tube-type collectors are handling various dust and fume control problems. Also included in this issue is a discussion on recent developments in the design of cloth filter collectors. Qualified plant engineers may have this issue and future ones. American Wheelabrator & Equipment Corp.

CRUSHERS

165 **Data on Crushers**—Sixteen-pp Bulletin 12-C covering company's line of crushers includes Knittel ring-type crushers, both single and double rotor; single-roll crushers; double-roll and two-stage double-roll crushers—units designed for reducing coal, coke, metal turnings, sugar, sulfur, other lump materials. Gives capacity and power requirements for crushers. Stephens-Adamson Mfg. Co.

166 **Shredder Ring Crusher**—A crusher for coal and similar materials which features rolling shredder rings is described in this 8-pp bulletin. Gives details on a survey of 28 typical installations. Informative tables giving speed, capacity, horsepower, weight and dimensions of crushers. American Pulverizer Co.

167 **Choosing a Crusher?**—Since the operating cost of the "wrong" crusher can become prohibitive, this company has prepared Bulletin 452, a handbook to assist plant engineers who, sometime, may want to select a crusher. This 12-pp, well illustrated booklet explains various crushing methods and their application. Discusses use of impact, attrition, shear, crushing by pressure, rolling compression, gravity impact and closed circuit grinding. Pennsylvania Crusher Co.

OTHER EQUIPMENT

168 **"Push-Button" Painting**—The what and how of this company's No. 2 Electro-Spray process is detailed in this 16-pp booklet. Five illustrated case histories demonstrate how it affords increased production, higher coating efficiency. The scope of this improved electrostatic atomization process is shown in a table telling the type of articles on which it can be used, coating materials applicable. Ransburg Electro-Coating Corp.

169 **Rotary Burners** — This newly-published 6-pp booklet describes burners designed for use with any type of oil, as well as for operation in combination with any type of commercially available gas. Gives construction features, explains automatic operation of the burners, specifications. Superior Combustion Industries, Inc.

170 **Templet File Facts** — This 48-pp booklet covers the contents and use of this company's Master Planning File of Repro-Templets on film. Lists machines and equipment included in the file and tells how they are used. Also describes other materials furnished and gives a price list of replacement materials. Templets provided in the file—some 3000 in all—cover most widely used machines and plant equipment. Repro-Templets Inc.

171 **Double-Punch Insecticide**—This booklet describes Vapesector, a concentrated liquid for spraying. It is formulated to penetrate the crevices where insects hide—and then penetrate their outer coverings to kill them. Explains how this insecticide acts, gives directions for use. West Disinfecting Co.

172 **Packaged Packing**—Illustrated Bulletin 463 presents the "Handy-Pack" package consisting of a convenient combination of metallic and plastic spiral packings for general sealing applications. Recommends this package for its value around the plant in providing flexible, lubricated metallic and semi-metallic spirals for cutting as required. Durametallic Corp.

173 **Elevated Steel Tanks**—Modern water storage in elevated steel tanks is the subject of illustrated Bulletin 201, 20 pp. With some 30 installation photos, gives data on five types of tanks—double elliptoidal, ellipsoidal, torodegmental, bottom, radial cone bottom and hemispherical bottom—in capacities ranging from 5000 to 3,000,000 gal. Pittsburgh-Des Moines Steel Co.

174 **Ceramic Coatings for Metals**—How industry can conserve strategic materials and extend life of metals used at high temperatures through the use of ceramic coatings is explained in this 28-pp brochure. Outlines benefits, design features and properties of company's Sulceramic coatings. Solar Aircraft Co.

175 **Practical Dimensioning** — By means of actual examples of good and bad dimensioning—35 examples in all—48-pp Form 1180 shows common errors in dimensioning a drawing, tells how to avoid and correct them. Stresses clear understanding of clearance, tolerances and limits. Single copies of this helpful booklet available free to plant engineers. Gisholt Machine Co.

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DATA FILE of literature for the plant library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. Following catalog descriptions are handy page references to advertisements giving information on related subjects.

ELECTRICAL

201 Buyers' Manual on Motors and Control—Fifty-pp Catalog GEC-1009 presents buying information on a carefully selected group of motors, motor starters, control accessories and electronic control. Ratings listed are those most frequently required. Excellent selection data, dimensions, ratings and prices. General Electric Co.

202 Motor Control—A handy reference book on modern motor controls, comprises 76 pp of condensed information, dimensions and prices of the most popular items in company's line. Covers a-c manual and magnetic across-the-line switches; a-c voltage starters, control relays and contractors; synchronous and high voltage starters; d-c control relays, contractors, starters; drum switches, a-c d-c rheostats, speed regulators; push buttons, limit switches, and accessories. Allen-Bradley Co.

203 Enclosed Motors—Construction features and details of totally-enclosed, fan-cooled motors with tube-type air-to-air heat exchangers in ratings from 40 hp at 600 rpm through 800 hp at 3600 rpm are described in Bulletin 51B749B. Points out that these motors come in standard and explosion-proof designs, the former for applications without explosion hazards but requiring protection from dust, fumes. Allis-Chalmers Mfg. Co.

204 Motor Panorama—Motors and generators—about 50 types in all—are pictured in Publication AEB 100.8B, which serves as a handy reference, since it lists specific literature dealing with each motor shown. Gives general construction details of each unit. Fairbanks, Morse & Co.

205 Big Induction Motors—Design and application features of Company's Life-Line motors (now made in ratings to 700 hp) are described in 20-pp Booklet B-4731. Applications of these motors in the paper, chemical, central station, mining, lumber and metal-working industries are illustrated. Separate sections describe the special construction of motor frames, end brackets, stators, rotors, and bearings. Westinghouse Electric Corp.

206 Motor Handbook — Bulletin MU-185 provides 66 pp of engineering and descriptive data on motors, covering splash-proof and explosion-proof types, gear motors, motors for use in chemical plants, for oil well pumping, punch presses, elevators, cranes and hoists. Wagner Electric Corp.

207 Weatherized Motors — Six-pp Bulletin 400 describes company's All-Weather integral motors for industrial use. These have full height protection, through ventilation, one-piece steel shell, interchangeability of end head. Robbins & Myers, Inc.

208 Bus Duct Manual—Booklet B-4272A, 68 pp, on bus duct and accessories, presents application and test data, specifications, information on pricing a typical installation. Describes advantages of bus duct for a secondary power distribution system, carrying current from transformers to switchgear—and from there to motors, lighting systems, etc. Tells where bus duct can be used to advantage. Dimensions given. Westinghouse Electric Corp.

209 Power Distribution Feeders — Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution system, gives construction, engineering, application data. Trumbull Dept., General Electric Co.

210 Overload Relays—Bulletin 1180-3 is a technical data sheet on overload relays designed to combine advantages of thermal and magnetic tripping characteristics for protecting a-c motors. Pictures design details. The Electric Controller & Mfg. Co.

211 Preventive Maintenance Tips—Booklet B-5477, 28 pp, discusses programs designed to reduce shut-down time on production lines and treats in detail the maintenance of power equipment. A suggested schedule of work and cleaning on power equipment is presented in chart form. Essential information on preventive maintenance for turbines, generators, switchboards, motors and controls given. Westinghouse Electric Corp.

212 Snap-Action Switch—Data Sheet 63 presents a "make-before-break" snap-action switch, describing in detail, with diagrams, the function of the two moving contacts in closing the normally-open circuit before the normally closed circuit is opened. Points out how the make-before-break principle insures continuity in operation of an electrically-controlled multi-stage machine. Micro Switch.

To get these free catalogs, list item numbers of those wanted on the postage-free cards provided for you on pages 35-36 and 133-134.

213 Automatic Voltage Regulation—Bulletin S-351 provides 12-pp of excellent selection data on company's automatic voltage regulators of the instantaneous electronic and electro mechanical types. Explains principles of operation of both types, their special features and applications. The Superior Electric Co.

214 Battery Technology Handbook—This is a 56-pp revised edition of company's manual of technical instruction and engineering data on the care of motive power storage batteries. Major addition is a section on charging, which includes information on modified constant voltage and two-rate charging, boost, equalizing and emerging charging, control of discharge, etc. Other sections cover the theory of the lead-acid battery; practical tips on care and operation; maintenance and repair. Gould-National Batteries, Inc.

LIGHTING

215 Recommended Lighting Systems—This 16-pp article describes six lighting systems adaptable to most industrial plants. They include systems for illumination levels 20 to 40 ft-c, for levels of 40 to 60 ft-c and for levels of 60 to 100 ft-c, and involve use of filament, fluorescent, and mercury lighting and combinations of these. Explains lighting classifications, and discusses advantages of each type of lighting. Lamp Dept., General Electric Co.

216 Precision Lamps—Bulletin 40 offers application and purchasing information on various types of lamps carried by manufacturer. Flood, infra-red, spatterproof, and weatherproof lamps are briefly discussed. Radiant Lamp Corp.

FUEL OILS, LUBRICANTS

217 The Why, What and How of Lubricants—This 20-pp booklet explains and illustrates common tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization, number, penetration, specific gravity, extreme pressure, steam emulsion, corrosion. Tide Water Associated Oil Co.

218 Cooperative Technical Consultation Service—This 24-pp booklet presents company's periodic consultation service offered to industrial plants and aimed at efficient use of petroleum products. Covers services available in solution of lubrication problems, metalworking operations, processing, fuel and heating oils, dust control. Gulf Oil Corp., Gulf Refining Co.

219 Lubricant Data Book—This pocket-size 56-pp booklet gives product information and principal uses of approximately 40 lubricants of both grease and fluid types, and general directions for proper application. Discusses lubricants requirements of equipment in 25 major industries. Lubriplate Div., Fiske Bros. Refining Co.

220 Viscosity of Fluids—The larger significance of viscosity is discussed in Nos. 5 and 6, Vol. 36 of Lubrication, a technical publication. Illustrates simplest conception of streamline flow between two surfaces having relative motion. Shows how viscosity is measured. The Texas Co.

221 How Lubricators Helped—Blueprint 106 is an industrial case history telling how die life was greatly increased and other wire forming operations improved by use of manufacturer's die lubricator. Includes operating and installation data. C. A. Norgren Co.

222 Force Feed Lubricators — Catalog 25-E, 12 pp, describes and illustrates force feed lubricators for positive and automatic lubrication of cylinders and bearings. Stresses accessibility of enclosed working parts. Also discusses lubrication of compressors, industrial machinery. Includes prices. Manzel Div., Frontier Industries, Inc.

MAINTENANCE

223 Corrosion-Preventive Coatings—This 16-pp illustrated booklet covers a family of products for fighting corrosion. Presents characteristics and application data on hot and cold applied tar base coatings, alkyd resin coatings, chlorinated rubber base coatings, vinyl and phenolic coatings. Includes finder chart. Protective Coatings Div., Pittsburgh Coke & Chemical Co.

224 Protective Paints — Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis, and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for use on wood, metal surfaces. Cellulose Products Dept., Hercules Powder Co.

225 Plant Paint Survey, Recommendation—This company will, upon request from a proper plant authority, make a plant survey to determine unusual operating conditions such as fumes, acids, alkalies, abrasions, moisture and the nature of any previous paint failure. After lab conferences, a recommendation based upon customer's needs and color-scheme preferences is presented in booklet form tailor-made for that particular plant. Requests for this service MUST come from an authorized individual. Valdura Division, American-Marietta Co.

226 Rust Preventives — Stressing water displacement as key to rust prevention, this 12-pp booklet tells how to choose rust preventives, ways to apply them to various surfaces. Outstanding properties of company's Stanorust products are discussed along with test data. Eight grades are described as to performance, best uses. Standard Oil Co. (Ind.)

227 Building Maintenance — Handbook 7 offers 64 pp of information on floor surfacings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.

228 Floor Maintenance—This 12-pp brochure presents a complete and economical program for the care of wood and concrete floors, terrazzo, linoleum and tile. Points discussed include wear resistance, appearance, sanitation, cleanliness, light reflectance, sealers and hardeners, burnishing and buffing. The Tremco Mfg. Co.

229 Roofing Manual—Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective coatings. Includes illustrated instructions. Tar Products Div., Koppers Co., Inc.

230 Basic Roofing Information—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also, special features of company's roofing materials. Explanations are brief, suggestions practical. Johns-Manville.

231 Iron Cement Handbook—This is a 40-pp pocket-size catalog of iron cements for repair, other uses. Tells how to mix and apply them. Gives illustrated instructions for dozens of repair and maintenance jobs. Smooth-On Mfg. Co.

232 Power Sweepers—Bulletin S-101 pictures and describes power sweepers for industrial, commercial plants. Comparative operating data are given on each sweeper as a guide to selecting correct model and size. Chart showing savings in man hours and sweeping costs afforded is included. Wilshire Power Sweeper Co.

233 Power Brushes—Bulletin C-269, describing company's new power brushes, pictures their design. The Osborn Mfg. Co.

234 Case Histories on Brushing Problems—The solutions to 12 industrial brushing problems are told in this 32-pp illustrated booklet. Shows how rotary wire brushes, specially selected or engineered for the job, are used to perform abrading, cleaning and finishing jobs. Brush Div., Pittsburgh Plate Glass Co.

CONSTRUCTION

235 Construction Handbook—This is the 56-pp 1952 edition of company's Architects' and Engineers' Reference Manual covering built-up flat and steep roofing, flashing, roof drainage, waterproofing and dampproofing. Fully illustrated, provides specifications, application information. Presents most practical methods and procedures, showing construction secured when specifications are followed. Available to qualified plant engineers; please state title when requesting this book. The Barrett Div., Allied Chemical & Dye Corp.

236 Building Panel Engineering Data—This 40-pp reference book for use of steel and aluminum panels for walls, decks and roofs, discusses their use, advantages, methods of installation. Covers acoustically treated panels, fire resistance ratings, electrification, acoustic roofs, reinforcing floor forms. Detroit Steel Products Co.

237 Aluminum Building Sheet — Stressing advantages of aluminum for siding and roofing, 12-pp Form AD-247 presents both dimensional data and engineering details covering its use. Provides illustrated suggestions for use of fasteners, flashing details, directions for applying the sheet. Includes tips on painting, welding, storing. Aluminum Co. of America.

238 To Nail It Right—Available for use with company's hardboards in plant construction work is the "Dial-It-Right, Nail-It-Right," a small cardboard reference wheel. The "Dial-It" side shows type and thickness of hardboard for exterior and interior walls, ceilings, underlayment wainscots, bench tops, doors and other uses. Reverse side gives nailing instruction. Masonite Corp.

239 Technical Manual on Plywood — Available basic data on Douglas fir plywood, its properties and use, are offered in looseleaf sections with firm binder. Presents engineering information about this panel material and its performance in varying applications. Covers commercial standards, designing with plywood, prevention of condensation, lateral bearing strength of nailed plywood joints, deflection. Please give your title when requesting this book. Douglas Fir Plywood Assn.

240 Floors for the Job—The merits of selecting the proper flooring for any industrial installation is stressed in this literature. Explains how company is set up to offer assistance in choosing flooring to meet individual plant needs. Kentile Inc.

241 Technical Data on Plexiglas—This is a file folder of information on Plexiglas sheets, rods, molding powders, covering workability, properties, thicknesses. Discusses large area lighting. Rohm & Haas Co.

242 For Lightweight, Fireproof Roofs—This 12-pp booklet describes an insulating roof tile offering strength and light weight. The economy, fire resistance, easy erection and other advantages of the tile are discussed and much helpful data on its use provided. Includes illustrated specifications, design data and details on its installation. Technical data on its insulating value, dimensional stability, other properties also provided. Nine photos show some installed. Kaylo Div., Owens-Illinois Glass Co.

243 Standard Screw Products—This 10-pp booklet about "Unbrako" standards tells what they are and the advantages of their use. Gives detailed information on socket head, cap screws, self-locking socket set screws, socket set screw points, flat head socket cap screws, shoulder screws or stripper bolts. Standard Pressed Steel Co.

PUMPS, COMPRESSORS

244 How to Solve Pumping Problems—Form 3060 is a 130-pp manual on selection, use of pumps. Tells type of pump construction best suited for handling 150 liquids. Explains how to determine size, compute suction list and discharge head, determine direction of rotation and size of speed of pulleys or gears. Gives instructions for installing rotary pumps, locating trouble. Geo. D. Roper Corp.

245 Centrifugal Pump Handbooks—Two instruction booklets covering installation, operation and repair of company's single-stage single-suction and multi-stage centrifugal pumps are available. They include illustrated description of such late developments as Magic-Grip couplings, universal joint couplings with Magic-Grip bushings, mechanical seals. Suggest regular inspection procedures and include pages for maintenance records. Also provide handy reference tables explaining

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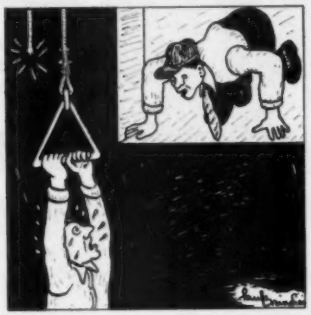
how to locate trouble and listing causes and cures. Bulletin 08X7813, 24 pp, covers single-stage pumps; Bulletin 08X7780 48 pp, covers the multi-stage pumps. State choice or both. Allis-Chalmers Mfg. Co.

246 Close-Coupled Pumps—Revised Bulletin 710-1, 12-pp, covers manufacturer's Close-Coupled centrifugal pumps of the single-stage enclosed impeller type. General construction details of these compact, easily installed pumps are described, illustrated by cutaway drawings. Specifications, performance data and dimensions given. Gould's Pumps, Inc.



"Oh, there you are! The Chief wants you to drop whatever you're doing and report to him immediately."

247 Condensation Return Units—Bulletin 113-ST describes and illustrates packaged condensation return units for small, low pressure uses, covering pump capacities of 1½ to 22½ gpm. Aurora Pump Co.

248 Self-Priming Motor Pumps — Form 7240 describes and illustrates automatic operation and construction features of pumps, intended for pumping applications under suction lift where presence of air or vapor in liquid makes it impractical to use conventional-type centrifugal pumps. Includes selection chart, dimensional data. Cameron Pump Div., Ingersoll-Rand Co.

249 Air Compressor Selection Data—Factors to be considered in selecting a compressor are discussed and selector charts provided in 20-pp Bulletin IDC 9302-3, covering manufacturer's V and G air compressors. The Y line includes tank mounted and bedplate units, single- and two-stage types. Special features of each model are described, dimensions and ratings given. Westinghouse Air Brake Co.

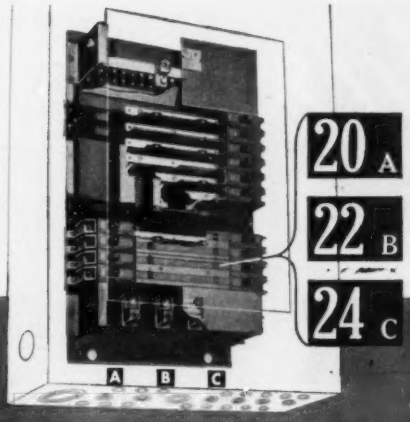
250 Compressor Selection Chart — Based on normal applications handling air with atmospheric intake pressure, this chart simplifies selection of proper size compressor, giving quick comparison between discharge pressure pounds per square inch gage and piston displacement cubic feet per minute. The chart shows recommended compressor bore and stroke in inches. Worthington Corp.

251 Rotary Compressors—Bulletin C-6 is company's most recent on rotary compressors. Fully illustrated, provides sketches of intake regulator, and bearing and ring assemblies, also photos of installations. Explains operation. Fuller Co.

252 Multi-Stage Compressors — Featured in 36-pp Bulletin 116 is a presentation of engineering data and performance characteristics to enable plant engineers to approximate power requirements, rotative speed and discharge temperature for most multi-stage centrifugal compressor applications. Clark Bros. Co., Inc.

PACKINGS

253 Long Wearing Piston Packing — Form 4502, 8 pp, presents composition cups for packing pistons of air and hydraulic cylinders and reciprocating pumps. Engineering information covers properties,



Circuit breaker panelboards, of course, but...

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Westinghouse Panelboards provide modern, labor-saving control of lighting and appliance branch circuit power distribution, electrically and mechanically.

For instance, no guesswork is required to determine the connections between branch circuits and main bus on standard 3-phase, 4-wire lighting Panelboards. Each circuit and the bus to which it is connected is clearly, permanently identified. Eliminates time-consuming ringing-out of circuits. Simplifies installation, wiring or rewiring for future circuit changes.

For the quality that delivers power effectively, cuts outage time, speeds installation and maintenance, look to Westinghouse Factory Assembled Panelboards.

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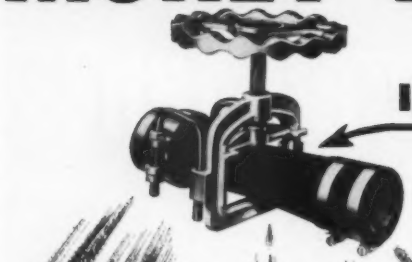


IF IT PLUGS

Basically, the Flex-Valve is just a piece of flexible tubing and a clamp to squeeze it shut. It can no more clog than a length of pipe. So, if you can clog one of them in normal service, just tell us, for the "incredible-but-true" record, how in the world you did it, and we'll send your money back.

Flex-Valves have solved thousands of valving headaches —in as many plants as there have been installations made. They can handle anything that flows, including aerated or fluidized solids. They close bubble-tight over ⅛" solids. Open, the flow is straight-in-line with the service piping, and completely unobstructed. There are no moving parts in contact with the lading fluid. Available in both natural and synthetic materials for every corrosive or abrasive service.

Complete details on this unique principle of control valving in slip-on, flanged, and air-motor operated types are available on request. Ask for ***Bulletin 500****—without obligation, of course.*

Farris FLEXIBLE VALVE CORP.

316 COMMERCIAL AVE. • PALISADES PARK, N. J.

1192

textures, temperature and pressure data, sizes. Darling Valve & Mfg. Co.

254 Data on Packings—Form 428 is a collection of bulletins on flexible metallic packing, semi-metallic packing, rotary mechanical seal, oil pressure system and steel packing tools. Durametallic Corp.

MECHANICAL POWER TRANSMISSION

255 Belts to Suit the Job—This bulletin presents company's "inner-locked" woven duck belting available in types for general elevating and conveying and general power transmission applications as well as special jobs. Imperial Belting Co.

256 V-Belt Drive Design Book—Providing 54 pp of engineering data on manufacturer's Bull Dog belts, this catalog gives general drive information as well as simplified methods of selecting V-belt drives, V-flat drives and several types of non-standard drives. Includes selection tables, dimensions and list prices. Boston Woven Hose & Rubber Co.

257 Manual on V-Belt Drives—Catalog 280 is pocket-sized, but contains 384 pp of illustrations, tables and other technical information to make it possible to select V-belts for any power transmission drive quickly and accurately. List prices, dimensions included, also a 12-pp supplement on cog belt drives. The Dayton Rubber Co.

258 Improved V-Belts — This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

259 Power Drive Handbook — Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

260 Blocks and Sheaves—Catalog 300-24 24 pp, covers manufacturer's complete line of blocks and sheaves. Provides block number, capacity in tons, number of sheaves, rope size and weight of each block. Illustrations, ratio table included. American Hoist & Derrick Co.

261 Variable Speed Control Simplified—Bulletin 700 contains some 40 pp of descriptive, application and engineering data on variable speed pulleys and selective speed transmissions. Illustrations show how old and new machines can be equipped with efficient variable speed control. Lovejoy Flexible Coupling Co.

262 Chart on Belt Care—In the interest of conserving power transmission belting, this manufacturer offers a cardboard wall chart on the care and maintenance of power driven belts. Carries sketches and brief text covering the steps to be taken to select the right belt, install it, use it correctly and keep it in good operating condition. Cling-Surface Co.

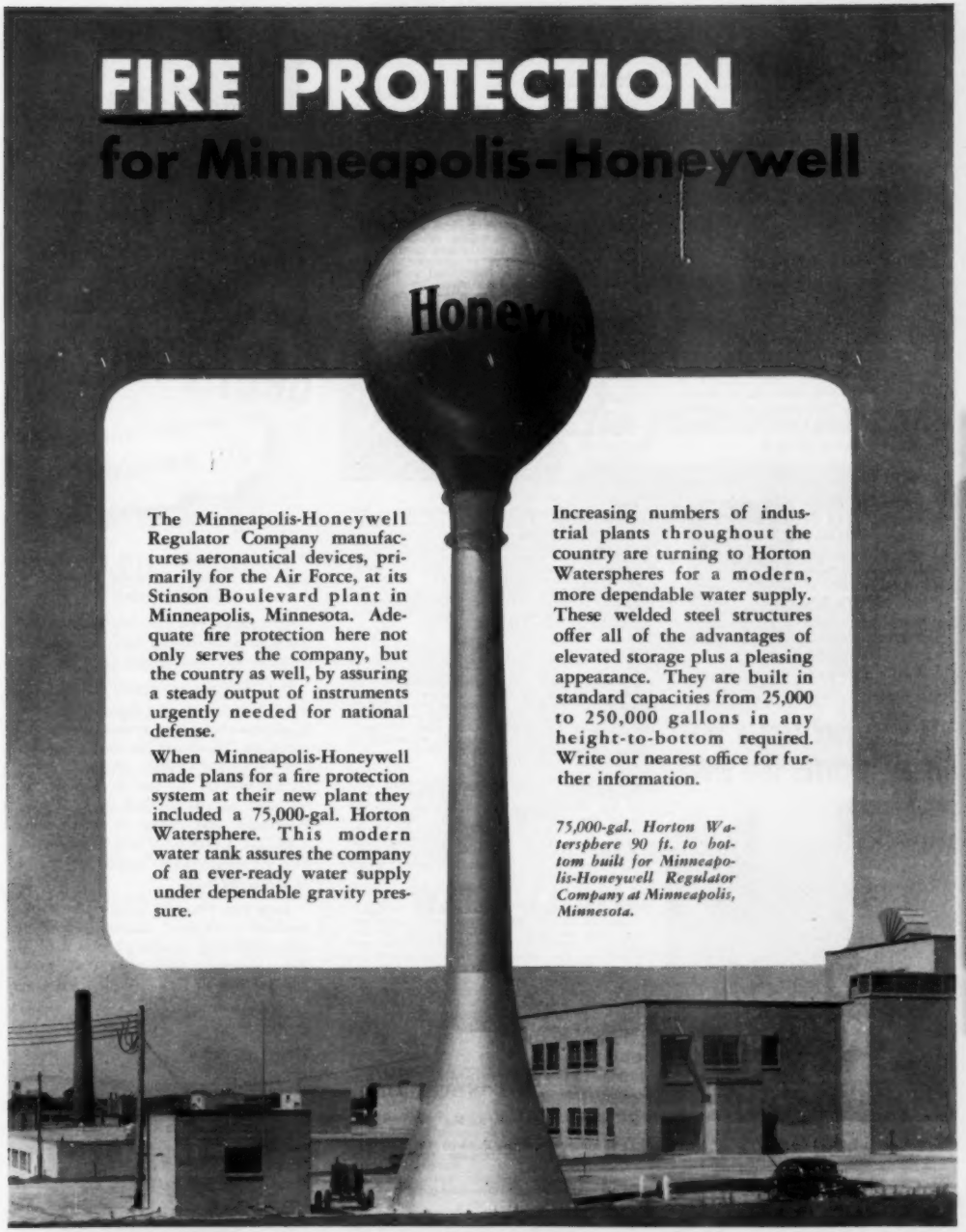
FANS, BLOWERS

263 Axial Flow Blowers—In this 6-pp illustrated bulletin are described axial flow blowers of both turbine-driven and motor-driven types. Gives capacity and dimensional data, operating range and specifications on both types. L. J. Wing Mfg. Co.

264 Blowers and Accessories—Engineering and dimensional information on low, medium and high capacity blowers is given in this recently-released 6-pp bulletin. Pictures some installations, also accessories. Blower-Stoker Div., Read Standard Corp.

265 Fans and Blowers—Illustrated Catalog 21A, 64 pp, gives ordering information on company's fans, blowers, roof ventilators and related products, including application suggestions, ratings, dimensions. Explains principle of curved orifice air-seal ring incorporated. Provides directions for installation and operation, maintenance

FIRE PROTECTION
for Minneapolis-Honeywell



The Minneapolis-Honeywell Regulator Company manufactures aeronautical devices, primarily for the Air Force, at its Stinson Boulevard plant in Minneapolis, Minnesota. Adequate fire protection here not only serves the company, but the country as well, by assuring a steady output of instruments urgently needed for national defense.

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Increasing numbers of industrial plants throughout the country are turning to Horton Waterspheres for a modern, more dependable water supply. These welded steel structures offer all of the advantages of elevated storage plus a pleasing appearance. They are built in standard capacities from 25,000 to 250,000 gallons in any height-to-bottom required. Write our nearest office for further information.

75,000-gal. Horton Watersphere 90 ft. to bottom built for Minneapolis-Honeywell Regulator Company at Minneapolis, Minnesota.

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Chicago, 4	2101 McCormick Building	New York 6,	3311—165 Broadway Building	Tulsa, 3	1617 Hunt Building
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Whether it's a minor matter of sealing breaks or repairing flashings, or a complete roof job, Tremco *planned* maintenance saves roofs by solving roof problems before they become costly.

Tremco Men "Know-How", backed by a quarter century of experience, makes effective results possible at low cost. In this case Tremco Man A.P. Morris planned this economical roof saving program. A Tremco Man like him is near you.

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Leaks are stopped before they start at The American Encaustic Tiling Co., Lansdale, Pa. Copings, gutters, valleys and parapets are inspected yearly by Tremco Man Morris. Maintenance costs only 1¢ per sq. ft. per year. Again Tremco experience and training pays off—in long roof life and low cost maintenance. Write today for Tremco's 32 page booklet, "Solving Roof Problems." The Tremco Manufacturing Company, Cleveland, Ohio, or The Tremco Manufacturing Company (Canada) Ltd., Toronto, Ontario.

TREMCO

PRODUCTS AND METHODS FOR BUILDING MAINTENANCE

UM 1020

and lubrication. Also discusses motors, special materials and coatings available. Several pages of excellent engineering data are provided. Hartzell Propeller Fan Co.

266 Industrial Fans—Available to plant engineers is a complete catalog on manufacturer's tube-axial type fans designed for system ventilation and vane-axial fans, in which guide vanes straighten the air stream to increase mechanical efficiency. The fans are available in ¼ to 50 hp, 1000 to 65,000 cfm. The Harvey P. Bertram Co.

DUST CONTROL

267 Industrial Dust Control—In addition to citing several examples of how company's Dustube collectors are solving the dust control problem in different industries, Vol. 1, No. 1 of Industrial Ventilation explains merits of cloth filtration. American Wheelabrator & Equipment Corp.

268 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.

269 Dust Collectors — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

270 Wet Method Dust Collection — Besides presenting company's line of Multi-Wash dust collectors, dewatering tanks and pumps, 22-pp Bulletin 510 explains advantages of wet method of dust control, discusses both simple installations and those requiring additional equipment. Covers in detail the widely used Senior collector, the Junior collector for single function operations, settling and dewatering equipment. Claude B. Schneible Co.

271 Dust Control Technology — Detailed selection, operation and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment, exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Pangborn Corp.

272 Dust Recovery — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoints of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

273 Manual of Exhaust Hood Design—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust sources. Includes tables of exhaust requirements, information on dust concentrations, weights of collected material. American Air Filter Co., Inc.

VENTILATING, DEHUMIDIFYING, AIR CONDITIONING

274 The Cost of Excess Moisture — Thirty-pp Bulletin 216 explains that while high humidity doesn't show it can spoil many products in process and storage. Tells how typical plants have solved the excess moisture problem by electric dehumidifiers. Pittsburgh Lectrodryer Corp.

275 Improved Air Conditioning—Advantages and applications of a controlled humidity method of air conditioning are discussed in Bulletin 112. Process is explained, illustrated. Niagara Blower Co.

276 How Conditioning Units Can Help—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling, hot water, steam heating. Clarage Fan Co.

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When your employes quit work Friday night—they may not have a plant to return to Monday morning.

All because you put your plant in the hands of a Watchman who was without adequate weekend supervision.

The DETEX GUARDSMAN tape-recording Watchclock was designed to solve management's major problem—how to watch the Watchman on long weekends and extended plant closings. The GUARDSMAN is just as vigilant on weekends as it is on week days. If your Watchman shirks, sleeps or skips rounds—the GUARDSMAN will expose him. The GUARDSMAN cannot be bribed or tampered with.

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277 Heating, Air Conditioning Book—Bulletin PB-290, 36 pp, is a complete, condensed catalog covering company's full line of air conditioning, heating, ventilating and heat transfer equipment. Supplements some 40 specialized bulletins on various product lines. The Trane Co.

278 Putting Air to Work—Catalog 600 is an excellent, 60-pp reference text on air and products to put it to work. For plant engineers concerned with heating and ventilating of plant areas; air conditioning installations; means of exhausting fumes, gases and dusts; conveying chips and granular materials; elimination of airborne dirt—this book is a valuable tool. It's packed with information on selecting and applying equipment, and there is a section of frequently-used reference data. Sturtevant Div., Westinghouse Electric Corp.

COOLING

279 Industrial Dry Coolers — Illustrated Bulletin DC-50, 12 pp, presents dry cooling equipment for small, "in-between," and heavy-duty cooling jobs and includes three recent models. Two are small "portable" units and the third a medium-size unit. Although designed primarily for cooling engine jacket water, they can be used for cooling natural gas, lube oils, fluids of refining stages. The Marley Co., Inc.

280 Jacket Water Coolers — Illustrated Catalog 1351 describes a line of engine jacket water coolers described as extremely rugged units capable of withstanding abuse of portable equipment installations. Details new design features of the units. Young Radiator Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

281 Iron Body Gate Valves—Bulletin 805, 8 pp, covers company's popular iron body, bronze trim gate valves in both outside screw and yoke and non-rising stem types, telling best applications for each. Design features explained. The Ohio Injector Co.

282 Efficient Flow Control — Data on bronze, iron, steel and corrosion-resisting valves in a wide range of types, for oil, common troubles as well as mysterious Shows how valves are designed for service, low maintenance. The Wm. Powell Co.

283 Automatic Valves — Pressure, flow, and liquid level controls for steam, air, gas and fluids are shown in 90-pp Catalog A-50. Includes sizes, prices, capacity charts, conversion tables. Davis Regulator Co.

284 Valve Maintenance Guide — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented. Discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

Three no-postage cards make it easy for you to order any of this literature. See pages 35-36 and 133-134.

285 Pressure-Vacuum Vent Valves — Bulletin E-601, 24 pp, is devoted to combination pressure-vacuum vent valves, stressing their low upkeep costs, positive shut-off, automatic operation and other features. Two types are presented — a standard assembly, and one with flame arrester element especially suited for use on storage tanks containing flammable materials. Black, Sivalls & Bryson, Inc.

286 Small Steel Valves—Illustrated Circular 134 describes a line of small cast steel valves for high pressure service. Tells how valves are built, where to use them. Gives dimensions, weights, prices on both globe and angle types. Walworth Co.

287 Regulating Valves—Bulletin 313 describes double seated diaphragm regulating valves for use with control instruments, outlining special features of the valves, particularly the "flow line" contoured body designed to provide high capacity at low pressure drop. Leslie Co.

288 Steam Trap Selection — Twenty-pp Catalog 600 provides practical selection information on bucket type steam traps, float and thermostatic types, compressed air traps, air eliminators and strainers. Explains how basic design principle of company's Airxpel traps fulfills requirements of a good trap. Includes capacity-orifice chart. Wright-Austin Co.

289 Solving Steam Trap Problems—This popular 36-pp catalog on steam traps contains specifications and capacities on steam traps, float traps, air release valves and pipe line strainers. Tells how to calculate condensation loads and select traps for all classes of equipment, including unit heaters, jacketed kettles, autoclaves, submerged surfaces, steam mains and header drips. Gives pointers on how to install traps and service them. The V. D. Anderson Co.

290 Steam, Air and Gasoline Traps — Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb; separators. W. H. Nicholson & Co.

291 Steam Trap Reference Manual—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains de-

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DRY AIR for your equipment!

WESTINGHOUSE Type "W"
WATER-COOLED AFTERCOOLER

YOU CAN INSTALL WESTINGHOUSE TYPE "W" AFTERCOOLERS ON EXISTING EQUIPMENT... SPECIFY IT ON NEW EQUIPMENT

When buying new compressors—specify the Westinghouse Single-Stage "Y" for double the air and triple the protection... and the Type "W" Aftercooler for dry air delivery.

If moisture in your compressed air supply is causing complications—here's your answer! The Westinghouse Water-Cooled Aftercooler removes the moisture, delivers dry air to your machines.

Entrapped moisture is drained from bottom of header by removing plugs. Drain cock or automatic drain valve available as optional equipment.

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Just 1/32" (pinhole size) faucet leak
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292 How to Install, Maintain Traps — Form 1722 is an 8-pp illustrated instruction folder covering use of company's traps. Installation section covers location of traps, hookups, bypasses, use of strainers, other factors to be considered. A chapter on trouble shooting includes discussion of trap troubles. Armstrong Machine Works.

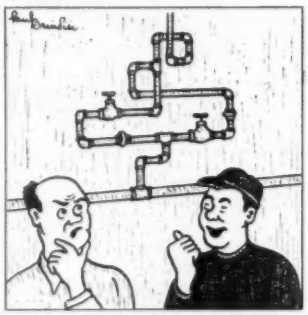
293 To Stop Those Leaks—Catalog 41-0 offers 28 pp of helpful ordering and application data on pipe repair clamps and saddles, valve and bibb reseaters. Illustrates each product, tells where to use it and how to install it, giving dimensions and prices. M. B. Skinner Co.

294 Strainers and Separators — Bulletin R-46-50A is a 16-pp catalog on T-type strainers, suction strainers, multi-flow and receiver separators. Contains dimensions, prices. American District Steam Co.

295 Handbook on Fittings, Flanges — Catalog wf-1950, 68 pp offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc.

296 Flexible Hose, Bellows — Catalog CMH-123, NPH, 16 pp, describes and gives specifications for manufacturer's line of Flexon bellows and flexible metal hose. Information on metallic bellows of stainless steel, brass, bronze and other alloys is included, covering bellows used in many types of control, regulators and thermostatic devices. A selection guide is provided for steam traps, valves. Flexonics Corp. (formerly Chicago Metal Hose Corp.).

297 Piping Pointers—This is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.



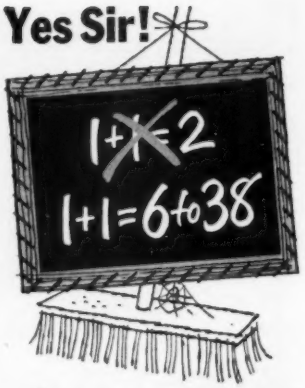
"Tricky and out of the ordinary, eh Chief?"

298 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculators, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.

299 Design Properties of Pipe—This 12-pp booklet consists of tables listing pipe sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of dimensional properties of commerical steel pipe. Tube Turns, Inc.

300 Manifold Discharge Piping Application—Manual 51-B, 34 pp proposes an

Yes Sir!



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Concord #20* STEAM HOSE

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NOTE TUBE SECURELY LOCKED BY SPECIAL STAINLESS STEEL INNER WIRE BRAID

Only with CONCORD #20 STEAM HOSE do you get this added extra protective feature for increased safety and longer hose life!

Here's the hose built to answer the problem that kills ordinary steam hose fast: *tube swelling under continuous high pressure.*

CONCORD #20's special stainless steel inner wire braid is there for one purpose: to assure retention of original inside hose diameter. It does this by combatting swelling and constriction of tube, which promotes full flow of steam and easy recoupling in the field when necessary.

You get these added structural features, too: two or three braids (depending on size) of alternate high tensile steel wire and rubber layers firmly bonded to outside of tube for maximum burst protection and safety; an asbestos braid for positive cover adhesion and cover insulation; a rugged cover that withstands toughest abrasion and abuse.

Put CONCORD #20 on your "must" list . . . contact your BWH distributor today.

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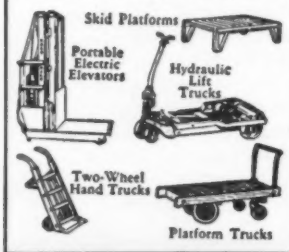
You'll speed up and simplify pallet-moving of materials — with the "Weld-Bilt" Pallet Truck! It's built to handle a greater variety of single or double-faced pallets easier and faster. Easier on truckers, too.

Check the design and construction of the "Weld-Bilt" and you'll know why. The sturdy forks, with their greased-for-life ball bearing wheels are easier to handle and position under loads of 2,000, 4,000 lbs. and 6,000 lbs. Other features include: Multi-stroke hydraulic lift, accelerator type lowering pedal, "anti-kick-back" safety handle, front wheel equalizer, ball bearing wheels, and many others — all built for longer service, easier operation.

Write For "Weld-Bilt" Pallet Truck Bulletin 1149.



WEST BEND EQUIPMENT CORPORATION
MATERIALS HANDLING ENGINEERS

304 WATER ST. • WEST BEND, WIS.

approach to design of discharge header systems based on partial or complete elimination of back-pressure effects on tied-in safety-relief valves. This principle is claimed to offer great savings in cost of discharge piping. Farris Engineering Corp.

STEAM GENERATORS

301 Re-Circulation Steam Generator — Here's a 6-pp folder introducing a controlled re-circulation steam generator, describing its developments and uses. Combustion Engineering-Superheater, Inc.

302 Packaged Steam Generators — This new 16-pp booklet on steam generators is profusely illustrated in color, providing photos, cut-away and schematic drawings and describing in detail the construction and operating principles. Explains induced draft, dry steam, four-pass downdraft design, 5 sq ft of heating surface per Bhp, flexibility of operation, and oil, gas and combination gas-oil burning equipment. Superior Combustion Industries, Inc.

REFRACTORIES, INSULATION

303 Rugged Refractories—Form 5120 is a 12-pp illustrated booklet explaining characteristics of several high quality refractories and telling what each is best suited for. Not an ordering book, covers silicon carbide types, electric furnace mullites, electrically fused alumina refractories and fused cast refractories, discussing their heat resistance, heat conductivity, chemical inertness, resistance to abrasion, spalling, thermal shock. The Carborundum Co.

304 Heat Insulation—This 8-pp booklet on hydrous calcium silicate insulation is illustrated with graphs, tables and drawings showing numerous ways this insulation is used in industrial and commercial projects for temperatures up to 1200 F. Lists the wide selection of shapes and sizes available to insulate tubes and pipes from ¼ to 72 in. dia and vessels from 72 in. to 60 ft, also flat surfaces. Also gives data on physical characteristics, thicknesses. Kaylo Div., Owens-Illinois Glass Co.

305 Pipe Insulation—Form 76-102 is a small folder stressing efficiency and economy of Amocel, a lightweight asbestos pipe insulation for temperatures to 650 F. Discusses its low thermal conductivity, high mechanical strength in relation to its weight, and physical stability. Union Asbestos & Rubber Co.

STOKERS

306 Where Refuse Is Fuel—Presented in 24-pp Bulletin 505 are installations of company's RotoStokers and RotoGrate stokers for use with medium size and larger units burning refuse fuels separately or in combination with coal. Lists many of the refuse fuels handled successfully by these spreader stokers. More than 20 installations shown. Detroit Stoker Co.

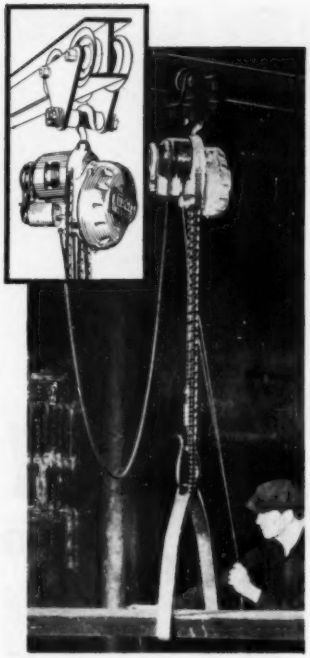
307 Spreader Stokers — Dumping-grate and traveling-grate spreader stokers are described as to design and performance and illustrated in color in 16-pp Bulletin SB-42. Typical applications of both types are presented and specifications included. Also discussed are feeder assembly and hydraulic power drive unit of company's Travagrate stokers. Erie City Iron Works.

INSTRUMENTS, CONTROLS

308 Handbook on Automatic Controls—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature, pressure-low water, liquid level, bottles; transformer-relays, valves. The Mercoid Corp.

309 Gages for Many Jobs—Sixty-eight pp of liberally illustrated information is offered in Catalog 64. Describes a variety of gage types; air volume controls for pump installations, vapor tension thermometers, d-c ammeters and voltmeters, and water flow meters covered. Includes engineering tables. United States Gauge Div., American Machine and Metals, Inc.

310 Fundamentals of Instrumentation—Booklet 80-2, just released, offers 126 pp



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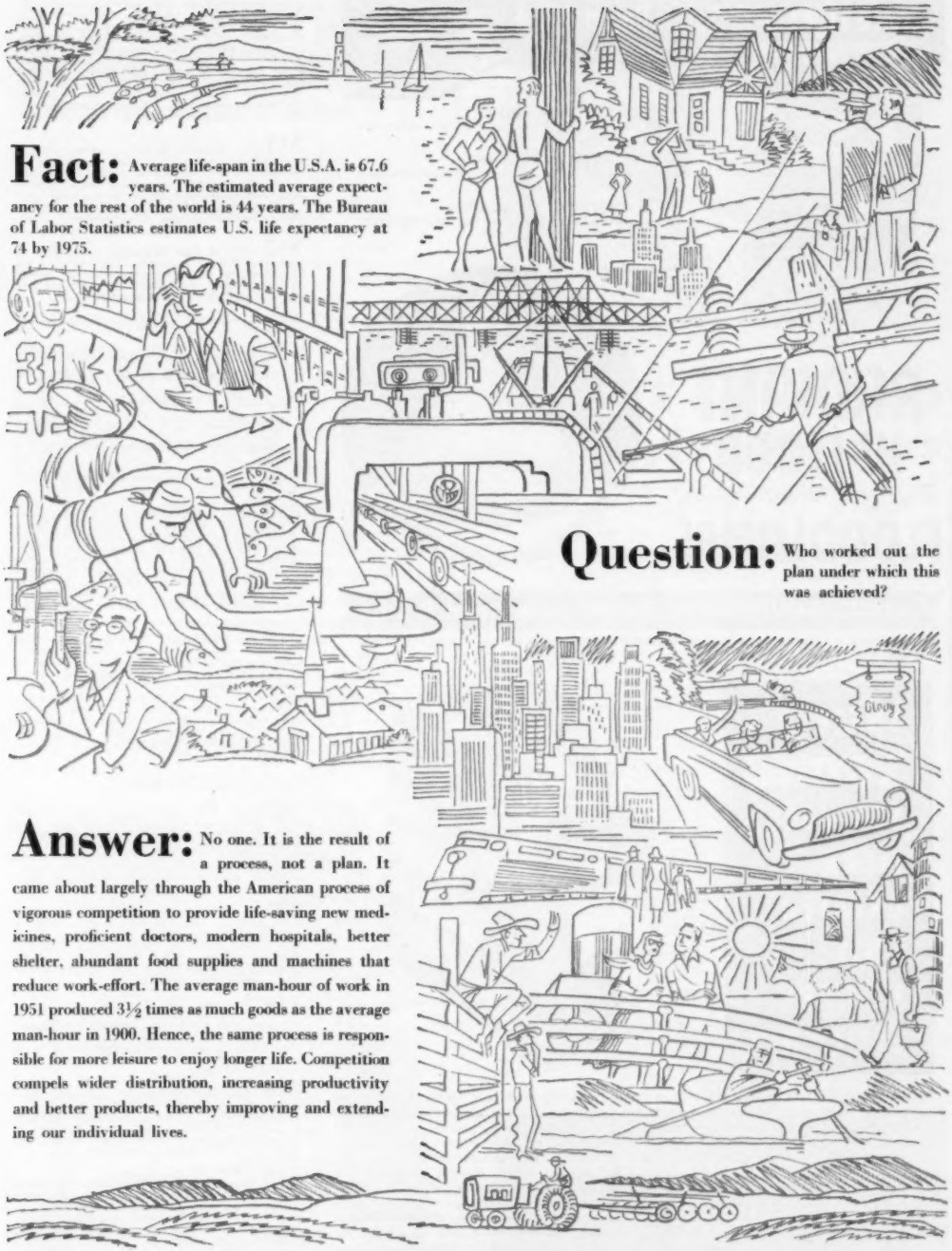

Fact: Average life-span in the U.S.A. is 67.6 years. The estimated average expectancy for the rest of the world is 44 years. The Bureau of Labor Statistics estimates U.S. life expectancy at 74 by 1975.

Question: Who worked out the plan under which this was achieved?

Answer: No one. It is the result of a process, not a plan. It came about largely through the American process of vigorous competition to provide life-saving new medicines, proficient doctors, modern hospitals, better shelter, abundant food supplies and machines that reduce work-effort. The average man-hour of work in 1951 produced 3½ times as much goods as the average man-hour in 1900. Hence, the same process is responsible for more leisure to enjoy longer life. Competition compels wider distribution, increasing productivity and better products, thereby improving and extending our individual lives.

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Won't crack due to sudden temperature changes, moisture, and flying insects.

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No reflectors to clean. Higher light output maintained throughout life of lamp with sealed-in silver reflector.

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Only simple socket required for high or low bays. Uses light-weight, low-cost weatherproof outdoor lamp holders.

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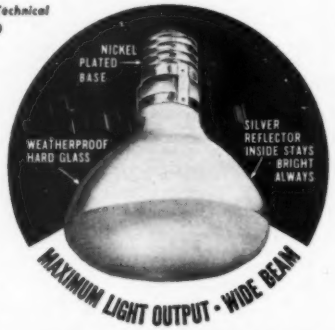
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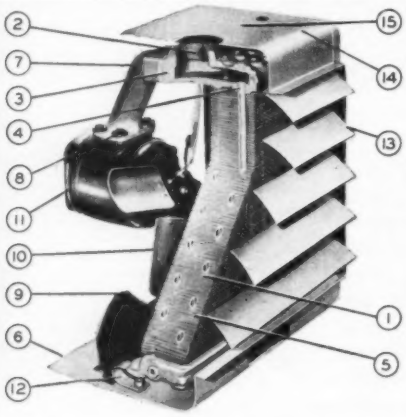

Young Type "SH" Unit Heaters are designed to provide a maximum amount of heat for warming "cold spots," as well as for general space heating applications. They are available in 14 sizes for hot water or steam systems up to 150 lbs. pressure.

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Factories at RACINE, WIS., and MATTOON, ILL.

of information on instrumentation in industry. Separate sections are devoted to the fundamentals of measurement and control, measurement of process variables, remote transmission of measurements, automatic controllers, power units and final control elements, control systems and panelboards. Typical applications are also discussed. Illustrated. Available to qualified plant engineers. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

311 For Liquids Worth Storing—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

312 Wide Range Regulator—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

See pages 35-36 and 133-134 for postage-free mailing cards. Use them to ask for bulletins—just list the item numbers of all those wanted.

313 Heating-Air Conditioning Controls—A complete and informative ordering book for thermostats, motor-operated valves and accessories for heating, ventilating and air conditioning applications is offered in 48-pp Catalog F-1753-3. Compiled to aid in selection of control equipment to meet rigid specifications, book provides application, installation data. Barber-Colman Co.

314 For Combining Control Signals—The improved design of company's Ratio Totalizer is described and pictured in color in 8-pp Bulletin 5452. This simplified, versatile mechanism is a pneumatically operated control for combining input control pressures and spring forces, and producing an output control pressure based on addition, subtraction, multiplication, division or more complicated functions of the input control signals. Hagan Corp.

TOOLS

315 Pipe Tool Book—This catalog and data book gives information on pipe and bolt machines, power units, ratchet threaders, reamers and cutters, other power and hand tools. Includes popular "operating guide" section, fully illustrated with easy-to-grasp drawings. Beaver Pipe Tools, Inc.

316 Powerful Puller—Introduced in Bulletin 97-A is the compact Power-Twin, a fast-working hydraulic ram. Shows how this ram, with its center hole feature, can convert all of company's pulling systems to hydraulic push, pull or lift operation. Owatonna Tool Co.

317 For Faster Fastening — Form 35-A explains and illustrates company's system of fastening tools and fasteners for use with steel, wood, concrete, fabricated hard materials. Ramset Fastening System, Inc.

318 Stud Driver—Special operating features of company's Model 450, a self-powered quick fastening tool, are detailed in Form 937A. Photos show how the driver is used and picture it in action. Industrial Tool Div., Remington Arms Co., Inc.

319 Tube Working Handbook — Form 369-A is a 32-pp booklet on tube working tools. A section on modern tube working practices covers handling, cutting, flaring, reaming, refacing or fittings, bending, soldering and other operations. Company's line of tools is described along with selection and application information. The Imperial Brass Mfg. Co.

320 Metal Spraying Gun — Company's Type 4E gun for high-speed spraying with all metals is described in Bulletin 94. A

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Realock Fence provides real locked-in protection for your grounds and property. All fittings have bolts placed so that nuts are removable only from the inside ...thereby insuring safety from intruders.

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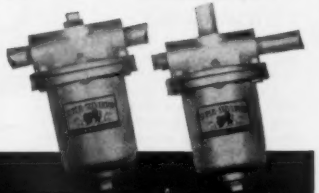

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Acid Resisting Belt at Fafnir Bearing Co. lasts 6 times longer

The belt pictured here at The Fafnir Bearing Co., New Britain, Conn., handles tote pans washed in a cleaning compound containing acid. The belt is also exposed to cutting oils. No other belt previously used in this service lasted over four months. This Imperial Rexall 620-A belt, installed in August, 1950, is still in excellent condition and is expected to last two years or longer.

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Imperial Rexall 620-A belting is constructed of 37½-ounce tight-woven silver duck—double-stitched with innerlocking stitches to permanently prevent ply separation. Impregnation with special compounds makes the belt acid-resistant and produces a smooth, hard low-friction surface that is ideal for deflection and slider-bed service. Rexall 620-A belting is also very effective for handling flax seeds, soybeans and acidulous feeds.

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BIG BROTHER TO THE FAMOUS
17½ TON
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Really dynamite . . . that's the new heavy duty 30 ton Power-Twin Hydraulic Puller . . . light . . . compact . . . has safe remote control operation. The tough new Power-Twin develops 30 tons of power with only 100 pounds of pressure on the pump. It will pull or install bearings, gears, pinions, shafts, studs, wheels, pulleys, etc. Works wonders as a heavy duty jack, spreader, straightener or compressor.

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See your jobber for complete information or write us . . . today.

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cutaway drawing shows construction features of the gun which is designed for tool-post mounting or hand operation. Metallizing Engineering Co., Inc.

WIRE ROPE

321 To Keep Wire Rope at Work—Form 3547 is an 82-pp handbook titled "Here's How To Keep Your Wire Rope Working," and filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Divs., American Chain & Cable Co., Inc.

322 Wire Rope Handbook—Catalog G-15, 170 pp, is pocket-sized and thumb indexed, and one of the handiest available from standpoints of practical information, easy reference and clarity. Provides up-to-date information on a wide range of Preformed and regular type wire ropes, slings and fittings and includes a section of data helpful in selecting the right rope for the job, installing it properly and keeping it in condition to get best use from it. Macwhyte Co.

323 Wire Rope, How to Use It—Practical information on the use and care of wire rope is given in 72-pp pocket-size Catalog C-51. Covers unloading, storing, kinking, unreeling, installing, breaking in, methods of seizing and cutting, measuring, end preparations, many other pertinent factors. Fully illustrated with photos and sketches, treats splicing in detail and includes chapter on lubrication. Also presents data on wire rope constructions, efficiencies of fittings. Available to qualified plant engineers. A. Leschen & Sons Rope Co.

MATERIALS HANDLING

324 Space Saving Fork Trucks—Operational features, engineering details and maintenance advantages of maufacturer's Spacemaster electric fork trucks are described and illustrated in recently published Catalog 32, 20 pp. Trucks covered are from 1000- to 4000-lb capacity. Also included are special purpose attachments and accessories for extending usefulness of the trucks. Lewis-Shepard Products Inc.

325 Safe Truck Operation — "Safety Saves!" is a 24-pp booklet setting forth "do's" and "don'ts" established as a practical code of truck operation. The admonitions, pointed up by cartoons, serve as both "refresher course" and text. Industrial Truck Div., Clark Equipment Co.

326 Shovel and Loader — Described in 12 pp Bulletin 1032 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.

327 High-Lift Trucks — Bulletin 5143, 12 pp, describes and pictures company's Powerox Hi-Lift electric trucks in tilting and non-tilt fork types, platform and straddle types, of 2000-lb and 4000-lb capacities. Barrett-Cravens Co.

328 Hydraulic Lift Trucks—This catalog provides engineering and ordering information on manufacturer's complete Weld-Bilt line of hydraulic lift trucks in 2500- to 10,000-lb capacities. Also covers skid platforms, pallet lift trucks, two-wheel trucks. West Bend Equipment Corp.

329 Conveyor and Elevator Belts—This 26-pp collection of catalog sections illustrates parts used in construction of company's conveyor and elevator belts. Discusses increased service life and decreased maintenance. The B. F. Goodrich Co.

330 Metal Conveyor Belts—This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belt; covers raised edge and flight constructions, chain edge constructions, high

temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

331 **Pneumatic Conveying** — Technical information and data on handling bulk materials with company's Airstream conveyors are presented in 24-pp Bulletin 529. Diagrams basic types, charts principal applications. Includes case history studies in various industries to illustrate advantages. Dracco Corp.

332 **Belt Conveyor Idlers**—Bulletin 51-81, 42 pp, presents latest developments of company's belt conveyor idlers and machinery. Includes engineering information helpful in designing and specifying belt idler equipment and cross-section drawings of both steel and cast gray iron idler rolls. New data on a return belt training (self aligning) idler is given, together with material on steep-angle troughed belt idlers and troughed belt self-aligning idlers. Information on lubrication material and techniques provided. Chain Belt Co.

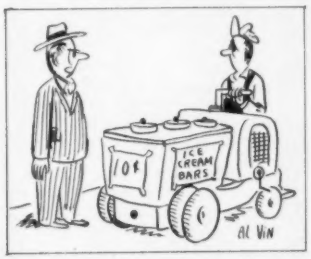
333 **Fastenings for Conveyor Belts** — This collection of data covers hinged fastenings, repair plates, facings, hooks, round belt couplings, also lacers, cutters. Gives instructions for use. Armstrong-Bray & Co.

334 **Three-Job Unit** — This bulletin on company's portable conveyor-loader-stacker features an easy-to-use dimensional chart showing loading and unloading heights and other major dimensions. Also includes specifications, data on optional equipment. The E. W. Buschman Co., Inc.

335 **Feeders, Conveyors** — An excellent presentation of electric vibrating feeders and conveyors is given in 90-pp Catalog 830 covering manufacturer's line of equipment for handling a wide variety of wet and dry materials and including large and small capacity units, for temperatures of -30 to 2000 F. Explains principles of design, operations. The Jeffrey Mfg. Co.

336 **Electric Hoist Manual**—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.

337 **Trolley Hoists**—Bulletin DH-269, 2 pp, describes and pictures ½ to 3 t capacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.



"Jordan, what's this about your making extra money on company time?"

338 **Chain Hoists** — Catalog 61, 32 pp, covers a line of chain hoists, telling how to select and use them. Provides an illustrated comparison chart of hoist types, a selector table and discussion of factors to be considered in buying a hoist. Multiple gear chain hoists, screw gear chain hoists, differential chain hoists, ball bearing and I-beam trolleys are described separately. Reading Crane & Hoist Corp.

339 **Industrial Lifts**—This booklet presents a wide range of elevating equipment

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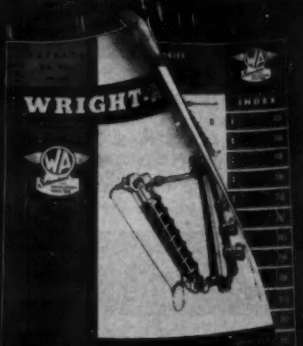

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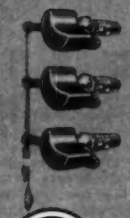

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designed to step up efficiency and cut handling costs. Covers dock lifts, crossover bridges, sidewalk elevators, truck service lifts. The Wayne Pump Co.

340 Sheet Lifters—Operational and design features of company's sheet lifting equipment which contribute toward emcient handling, flexibility and economy are explained in Bulletin S-25, 16 pp. Cullen-Friestedt Co.

341 Data on Truck Casters — As much specific information as can be presented in a catalog for commercial usage is included in 105-pp Catalog 124 on truck casters. Besides specifications, ordering data and photos, this well-indexed book includes load capacity charts, defines caster terminology, tells how to select casters and install them. The Bassick Co.

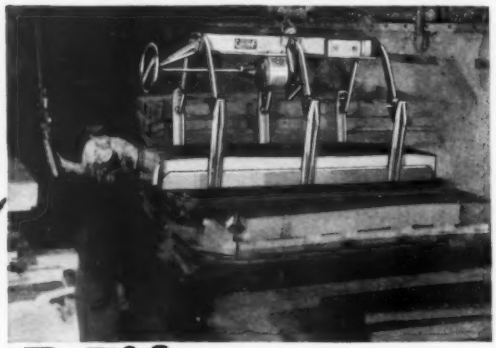
342 Trucks, Casters, Wheels — Catalog 50, 65 pp, covers platform trucks, superstructures, two-wheel and pry trucks, dollies, trailers casters, wheels, offering a variety of chassis, superstructure, wheel combinations. Thomas Truck & Caster Co.

343 Versatile, Flexible Tubing—Catalog 5-4 is an 8-pp folder on Spiratube, a tubing made of spring wire within overlapping plies of spirally wound fabric and designed for a wide range of ventilating and conveying jobs. Special features are presented and four types of this tubing discussed in detail. Flexible Tubing Corp.

344 For Emcient Overhead Handling—Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. Includes layout information. The American MonoRail Co.

345 Data on Tramrail Equipment — Twelve-pp Form 2068F is a recently revised booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design,

One man and a C-F Lifter...



One man and a C-F Lifter handle the sheet steel stock in and out of storage in this plant with ease, speed and economy. C-F Lifters can pick up, carry and unload more loads per hour using less man and crane time than any other method. Note how closely a C-F Lifter piles sheets—this results in great savings in storage space. Jaw adjustments for carrying different widths of sheets are made in a few seconds by the operator—an important feature when varying sizes of stock are used.

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Write for the bulletin "C-F Lifters." It illustrates the many cost saving advantages of these lifters.

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CAL-WIC WIRE CLOTH
In all Meshes, Weaves and Weights

Filtering, screening or grading—whatever your special job demands may be—Cal-Wic Wire Cloth is available in the right mesh, weave or weight to meet your requirements. Resistance to corrosion, abrasion and temperature extremes assured through the use of appropriate metals and alloys.

The long-wearing qualities of Cal-Wic Wire Cloth take on added importance during times like the present.

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INDUSTRIAL SCREENS
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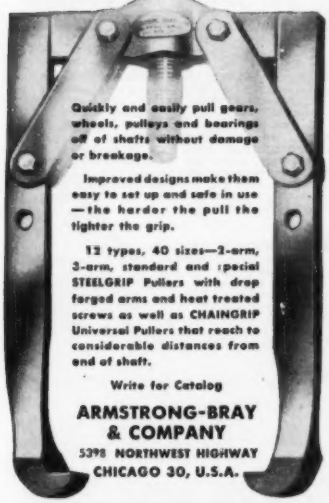
GEAR and WHEEL PULLERS



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12 types, 40 sizes—2-arm, 3-arm, standard and special STEELGRIP Pullers with drop forged arms and heat treated screws as well as CHAINGRIP Universal Pullers that reach to considerable distances from end of shaft.

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1/4" to 2" $38.75
1/4" to 3" $49.50

M. B. SKINNER CO.
SOUTH BEND 21, INDIANA, U.S.A.

switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

346 **Hydraulic Jacks**—Hand wheeled and gage-equipped jacks from 1½-t capacity models to 100-t capacity extra-heavy duty jacks are covered in Catalog J-50, 16 pp. illustrated, includes specifications, selection information. Blackhawk Mfg. Co.

MAGNETS

347 **Magnetic Selection Guide**—Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets serves as handy guide to the selection of magnets. Dings Magnetic Separator Co.

348 **Metal Detector**—Catalog E-41 describes the RCA utility metal detector, a protective device for indicating the presence of metallic particles magnetic or non-magnetic, in open or packaged non-metallic materials. Eriez Mfg. Co.

VIBRATION, SOUND CONTROL

349 **Engineered Vibration Control**—Bulletin 104 presents spring, cork and rubber mountings, discussing advantages of each and use alone or in combination. Provides helpful selection chart covering a wide range of machines, showing recommended and alternate methods of isolation. The Korfund Co., Inc.

"The boiler room is pretty far down, Chief . . . better try long distance."

350 **Easier Machine Installation**—Bulletin 415 describes how cost machine mountings that simplify machine installation control vibration, reduce noise and absorb impact. The MB Mfg. Co., Inc.

351 **Sound Facts**—This little folder gives the ABC's of noise. Tells what it is, how it is measured, and how company's sound control installations work to reduce noise levels to comfort range. Illustrates and describes briefly: machinery enclosures; sound barriers, traps; sound proof rooms. Industrial Sound Control, Inc.

WATER TREATING

352 **For Conductometric Determination of Solids**—A quick and simple method for determining solids content of boiler water or condensate is explained and illustrated in Bulletin 2RE50. Hall Laboratories, Inc.

353 **New Data on Zeolite Softeners**—Publication 4520-A is a recently revised edition of company's booklet on zeolite water softening. Provides a glossary of terms used in the process, data for laying out a zeolite softening plant, factors governing size of equipment, selection of zeolite materials and discussion of the four stages of operation of a sodium zeolite softener. Cochrane Corp.

SAFETY, SANITATION

354 **Dry Chemical Extinguishers**—New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. C-O-TWO Fire Equipment Co.

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355 Washroom Layouts — Sixteen blueprint drawings of industrial and institutional washroom layouts are shown in this 12-pp booklet. Provides a general discussion of washroom planning, also roughing-in data. Bradley Washfountain Co.

356 Protective Creams—This folder describes three creams with antiseptic as well as protective qualities, giving suggestions for use. Includes list of more than 175 hazardous substances, telling which cream offers best protection against each. West Disinfecting Co.

OTHER EQUIPMENT

357 Water, Waste Water Systems — An engineering and construction service for greater efficiency in industrial sewer systems and water systems is described in this bulletin. Discusses facilities for surveying requirements, testing, designing and construction. Pittsburgh Pipe Cleaner Co.

358 Tough and Flexible—Information is offered on Dynaprene cord, designed for durability and resistance to abrasion and cutting. Tells other advantages of this flexible, flame retardant cord. Whitney Blake Co.

359 Neoprene Goes to Work — Eight-pp Bulletin A-18 discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Rubber Chemicals Div., E. I. du Pont de Nemours & Co.

360 Welding Electrode Ordering Guide—Pocket-size Catalog R7-7 on electrodes for hard surfacing and for welding stainless alloy and mild steels, includes operating characteristics, current ranges, tensile strengths, polarity. Harnischfeger Corp.

361 Unit Pillow Blocks — Literature is available on this manufacturer's newest pillow block featuring a Fairprene seal which retains lubricant, and set screws for easy installation. SKF Industries, Inc.

362 Tips on Plant Protection—Instructive information for engineers whose plants are engaged in defense production is furnished in this 16-pp manual. It is intended to solve plant protection problems by instituting security systems for preventing loss of life, damage to property. Training of personnel, planning of hourly routes, safety factors, fire prevention discussed. Detex Watchclock Corp.

363 Plastics Price Lists—Inventory price lists for No. 1 and 2 grades of acetate, vinyl, lucite and other plastics are available. Cadillac Plastic Co.

364 Solder Text—This 36-pp book is basically an editorial treatise. Separate sections are devoted to thermal effects, mechanical properties, principles of soldering and fluxes. Selection of proper solder for the job is explained, and fusible alloys described. Practical suggestions and description of company's solders are provided, also technical data. Federated Metals Div., American Smelting and Refining Co.

365 Steam Condensers—Bulletin 102, 24 pp, is a comprehensive presentation of manufacturer's steam condensers and includes photos of six typical installations as well as a section of engineering data, a discussion of air removal equipment and condenser maintenance. Condenser Service & Engineering Co., Inc.

It's easy to order these free bulletins and catalogs. Use the postage-free cards provided for your convenience on pages 35-36 and 133-134.

366 Plumbing and Heating Supplies—Edition F is a 118-pp catalog listing over 2500 repair parts and precision tools for maintenance of all types of plumbing fixtures. Fully illustrated, includes plumbing fixtures. J. A. Sexauer Mfg. Co., Inc.

367 Fundamentals of Hydraulics—Technical Bulletin B-4 is a 44-pp guidebook covering essential information on hydraulic systems, maintenance, trouble-shooting and selection of proper fluids. Besides offering well-organized reference data for plant engineers, this book is suggested as a training manual for maintenance personnel. It features phantom and cutaway drawings showing functions of basic types of valves, pumps, hydraulic motors, torque converters. Sun Oil Co.

368 Seals for Bearings — Complete information on manufacturer's Klozure oil and grease seals for bearings is available in 100-pp Catalog 10. Fully illustrated with color, pictures all types of these seals, typical applications and gives list of sizes and part numbers. Also describes mechanical pressure seals for rotary shafts. The Garlock Packing Co.

369 Time-Saving Templates — Catalog 50 is a concise 8-pp ordering guide picturing and describing more than 40 drafting templates covering a wide range of engineering symbols. Includes electrical, piping, processing, welding, instrument, gears, fasteners. Prices given. RapiDesign Inc.

370 How Much for Steam — Here's a "slide rule" calculator for computing steam costs. It's pocket-sized, and enables a plant engineer to find comparative steam costs per 1000 lb. using coal, oil or gas, and based on fuel costs of price per ton, gallon, cubic foot. Cleaver-Brooks Co.

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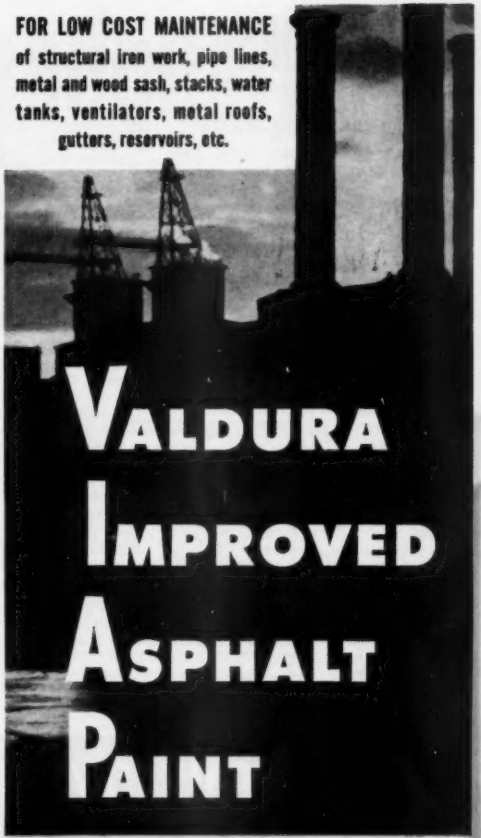

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NEW BOOKS for the plant engineer's library

On Milling and Milling Machines

A TREATISE ON MILLING AND MILLING MACHINES. Third edition; size 9¼ by 6¼ in.; 896 pp excluding index; illustrated; cloth bound. Published by the Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Price $8.00 ppd.

THIS BOOK combines theory and practice to bring before the reader one of the most thorough studies on milling. Milling machines of various types, from the simple to the very complex, are covered in the introductory chapter. Then, the book goes on to the classification and uses of accessories and cutters, cutting and so on.

Over 50 pages are given to the milling process, covering fundamentals, methods and elements. An entire chapter reports on production milling and offers examples along with relative formulas on cycle time per piece. The book also goes through an example on replacement using the MAPI replacement analysis.

Engineers as well as operators and others will find this book filled with a lot of milling knowledge which includes 200 formulas for working shop problems and over 700 illustrations and charts.

Power required in milling, the use of work indexing in repetitive milling operations, sharpening and care of milling cutters, fixtures and fixture design are titles of some of the 19 chapters in the book.

Finished Concrete Design

C.R.S.I. DESIGN HANDBOOK. Size 6 by 9 in.; 412pp; illustrated; cloth bound. Published by Concrete Reinforcing Steel Institute, 38 So. Dearborn St., Chicago 3, Ill. Price $5.00.

HERE IS a guide that can streamline computations for reinforced concrete jobs. It is not intended as a substitute for the judgment of experienced structural engineers. However, the book offers time cutting assistance in the form of its tables, diagrams and formulas. Even though the book mainly presents finished design information, consideration is given those who wish to do their own computation through the complementary technical content.

Finished design data in the book covers a variety of construction requirements. Take for example concrete joist construction; a typical table on this carries information on joist spacing, bar sizes, span, and safe superimposed loads (psf).

Thirty-three suggestions for making drawings of reinforced concrete structures are included in this book along with suggestions on standard design details.

Scientific Work Evaluation

WORK MEASUREMENT by Adam Abruzzi. Size 6 by 9 in.; 290 pp; cloth bound. Published by Columbia University Press, 2960 Broadway, New York 27, N. Y. Price $6.00.

THIS BOOK presents objective ways for establishing standards and identifying factors that have a bearing on the results in work measurement. It points out how to closely predict the performance of workers and how to set up standards that are practical.

Industrial engineers interested in work measurement can find this volume useful in establishing a scientific approach to their studies. Besides, it can be of help in acquainting labor and management people with thinking that de-emphasizes the bargaining factor in work evaluation.

Throughout the book are found

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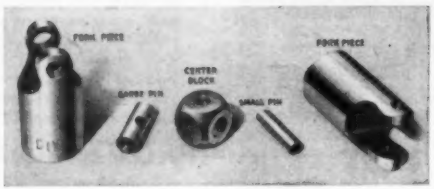

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Junior is putting on his GI uniform for the veterans' parade to remind everyone to register so they can vote Nov. 4.
Sis is boning up to write her entry in the Citizenship Essay Contest the businessmen's association is sponsoring at school.
Dad's easy chair is empty—he's at the meeting of the citizens' get-out-the-vote committee.
Mother's helping her club make a telephone campaign telling everyone when and where to register.
Grandma's sending registration reminders to all the church members. Even little Sis is helping—rubber-stamping messages on the cards.

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NOT THE FARM VOTE...
THE BIG-CITY VOTE...
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Politicians talk a lot about this and that "bloc" of voters being decisive factors in this election. So do all the pollsters. You can't blame them for trying to dope it out that way in advance . . . but . . .

YOU know you're going to vote your own sweet way when you get behind that voting booth curtain—that where you live or work hasn't got a blankety-bloc thing to do with how you'll vote. You'll vote for what you believe to be in the best interests of your family—your kids—and your kids' kids.

So YOU know that this year—as always—it will be the FAMILY vote that really decides things. And families are working as never before to make sure every American votes. Right now in millions of American families, everyone from Little Sis to Grandma is pitching in to remind every eligible American to register to make sure of the opportunity to vote. And then they'll tackle the job of getting out the vote of every member of America's 44,000,000 families. They're the biggest "bloc" in America—they ARE America!

If your family is already working at the job—congratulations! If you aren't, talk it over at supper tonight, and pitch in tomorrow.

25 figures and 55 tables as additional aid to the reader. Some of the subjects covered by this volume are as follows: case studies of local stability; developing standard data for operation elements and motions; the relationship among operation elements; comparing the work methods of different operators and measuring and estimating delay factors.

Metal Knowledge

PRACTICAL METALLURGY FOR ENGINEERS. Fifth edition; size 5½ by 8½ in.; 599 pp; illustrated; cloth bound. Published by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. Price $3.50.

IN THIS REVISED edition, are covered the recent advances that have taken place in the metal industry. Beginning with fundamentals, the book discusses various metals, alloys and processes. Extensive coverage is given to heat treatment of metals.

A discussion on steel classification is included. Both the A.I.S.I. and S.A.E. systems are mentioned. Tables in the book present a variety of steel designations along with the chemical composition by percentage. The back portion of the book carries useful standard technical reference data.

Heat treating, liquid salt baths, cleaning procedure and control, testing and inspection, grain size and hardenability, and temperature measurement are some of the subjects in this informative book.

Electricity

ELECTRICAL REFERENCE by E. S. Lincoln. Second edition; 8¼ by 11 in.; 1744 pp; illustrated; cloth bound. Published by the Electrical Modernization Bureau, Inc., New York 17, N. Y. Price $25.00.

SINCE MODERN plants rely heavily on the use of electricity, this form of energy often comes into the limelight in discussion. To help plant engineers and others in their responsibilities and search for further know-how on the subject this revised edition should go a long way.

The book's 26 sections present a wide range coverage of reference material. Consideration is given to both the industrial and commercial aspects. Material on inspection and maintenance is included in the text.

Professional Engineer's License

PAST EXAMINATIONS FOR PROFESSIONAL ENGINEERS. Size 8½ by 11 in.; 45 pp; stapled. Compiled by John D. Constance, 625 Hudson Terrace, Cliffside Park, N. J. Price $1.25.

THOSE ENGINEERS who plan to take the examination to obtain a Professional Engineer's License will find this material of help in preparing for the examination. A compilation of past examinations covers tests which were given in the state of New York for the years 1943 through 1951.

Questions for each examination are broken down into three parts: Part I deals with structural planning and design; Part II contains the practical application of the basic engineering sciences; and Part III covers economics and practice, chemical, civil, electrical and mechanical engineering.

Corrosion Testing

CORROSION TESTING PROCEDURES by F. A. Champion. Size 5½ by 9 in.; 369 pp; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $6.25.

THIS BOOK WILL be of particular interest to investigators concerned with practical problems in the corrosion of metals in service and the production of metal of adequate corrosion resistance.

In view of the wide variety in the objects of corrosion tests, the text is broken down into the following stages: 1. The choice and preparation of metal and corrosive, 2. Exposure of the metal to environment in laboratory, field, or service tests; 3. Cleaning of specimens preparatory

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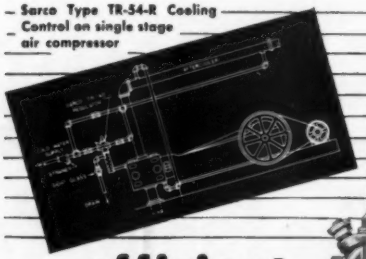

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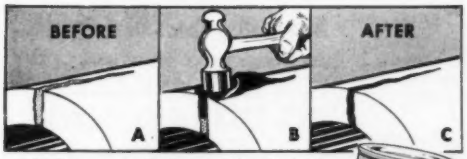

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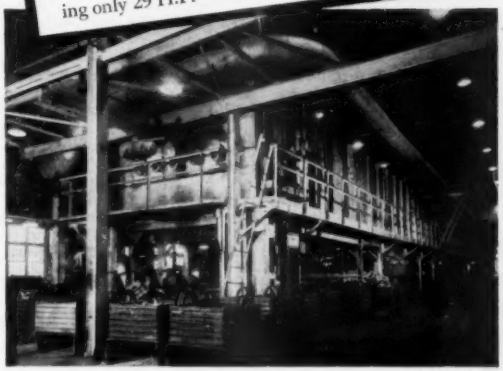

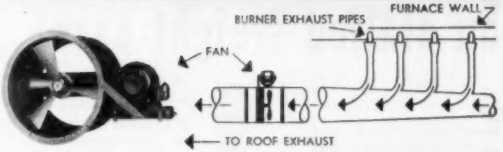

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to examination; 4. Examination of specimens; and 5. The expression and interpretation of results, with particular reference to the form of the corrosion/time curve.

The investigator can then choose the appropriate combination of alternatives for his particular purpose, but he must consider his procedure as a whole. For example, if the loss of weight of the metal by corrosion is to be determined, it is evidently desirable to use specimens with a high ratio of surface area to total weight.

Developing Future Executives

THE DEVELOPMENT OF EXECUTIVE TALENT. Edited by M. Joseph Dooher and Vivienne Marquis. Size 6 by 9 in.; 576 pp, including bibliography and index; illustrated; cloth bound. Published by American Management Association, 330 West 42nd St., New York 36, N. Y. Price $6.75.

THIS HANDBOOK on management development techniques and case studies is designed to meet the needs of any company contemplating the introduction of a program of executive development for the first time, or desiring to improve its present program.

Subjects covered include: setting up the program—basic principles and practices; organization planning; putting the program into action; special approaches; techniques and programs; getting results from follow-up counseling; program evaluation; trends in management development; and case studies.

Metalworking

FORGING AND FORMING METALS by S. E. Rusinoff. Size 5½ by 8¼ in.; 279 pp; illustrated; cloth bound. Published by American Technical Society, 848 East 58th St., Chicago 37, Ill. Price $3.95.

THE ART of manually and mechanically shaping metals to desired form is aptly covered by this new book. Well chosen illustrations of various methods bolster the text material in bringing before the reader a broad picture of industrial forging and forming.

The book, however, is not strictly devoted to discussions on forging and forming methods. It covers cleaning, testing, finishing and inspection of forgings. Space is also given to the design of tools and dies for forging and product design.

Here are a few of the 24 chapters in this book: metal quality; impact-die or drop forging; safety in forging operations; upset forging and standard practices; tolerances; and impact-die forging.

Questions appear at the end of chapters for the reader to brush-up on what has been previously read.

Mathematics Shows What Happens

MATHEMATICAL ENGINEERING ANALYSIS by Rufus Oldenburger. Size 6 by 9¼ in.; illustrated; cloth bound. Published in 1950 by The MacMillan Co., 60 Fifth Ave., New York 11, N. Y. Price $6.00.

THIS HIGHLY TECHNICAL book presents ways of translating physical engineering happenings into representative mathematical language. To grasp the teachings of this work, the interested reader should have a background of advanced physics and mathematics.

The book is conveniently arranged in five sections. Each one separately treats subjects that fall into a specific category of physics. The following are titles of the various parts: mechanics of rigid bodies; electricity and magnetism; heat; elasticity and fluid mechanics.

Notes on Maintenance Show

TECHNIQUES OF PLANT MAINTENANCE, 1952. Size 8 by 11 in.; 182 pp; illustrated; cloth bound. Available from Clapp & Poliak, Inc., 341 Madison Ave., New York. Price $6.00.

PROCEEDINGS OF THE technical sessions held at the Third Plant Maintenance Show in Philadelphia, January 1952, are presented in this book.

The book covers discussions and

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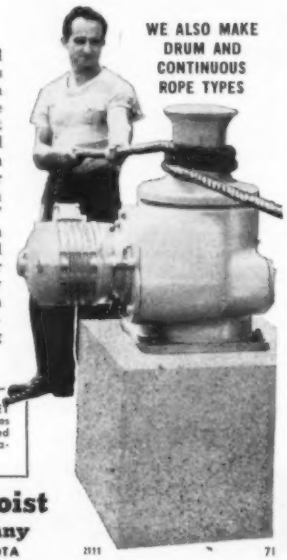

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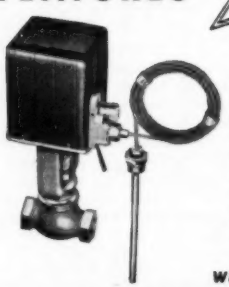

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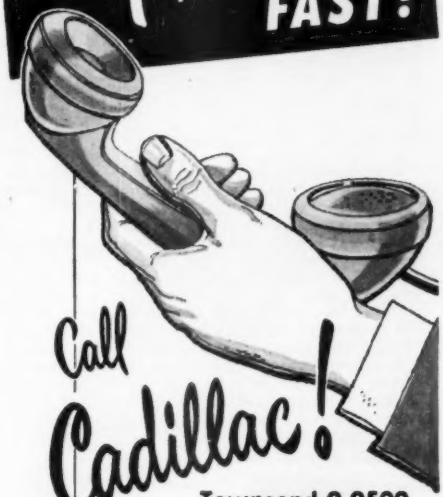

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Spartan Mills

(Continued from page 75)

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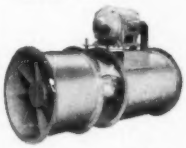

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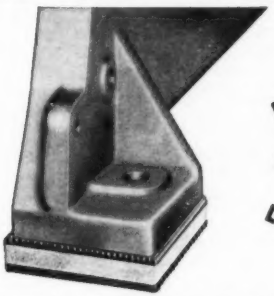

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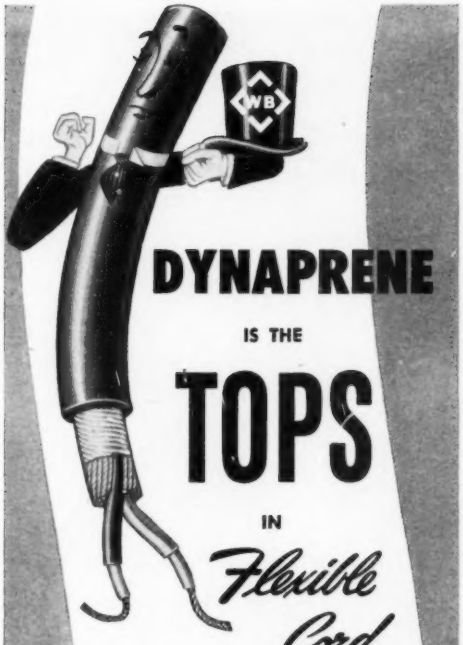

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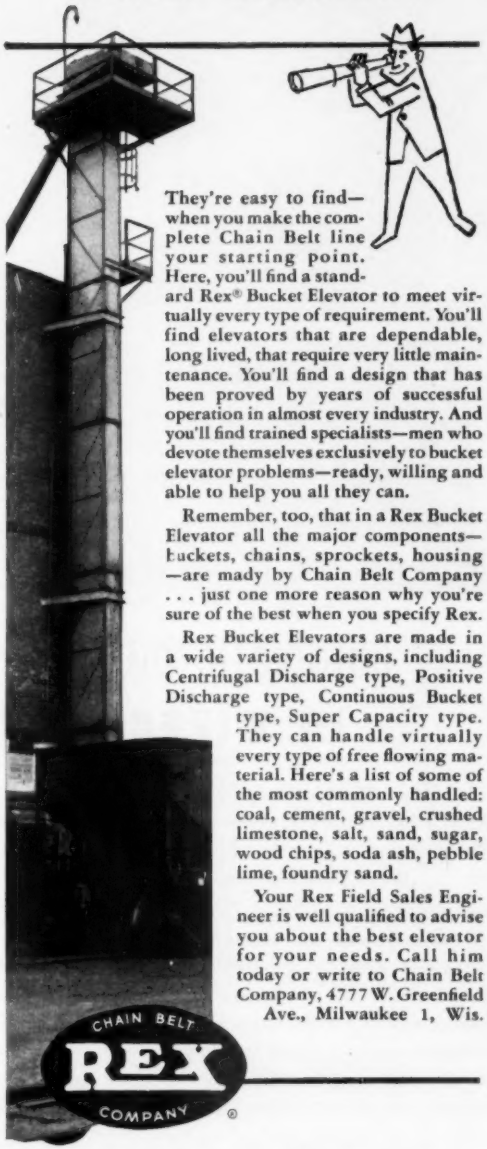

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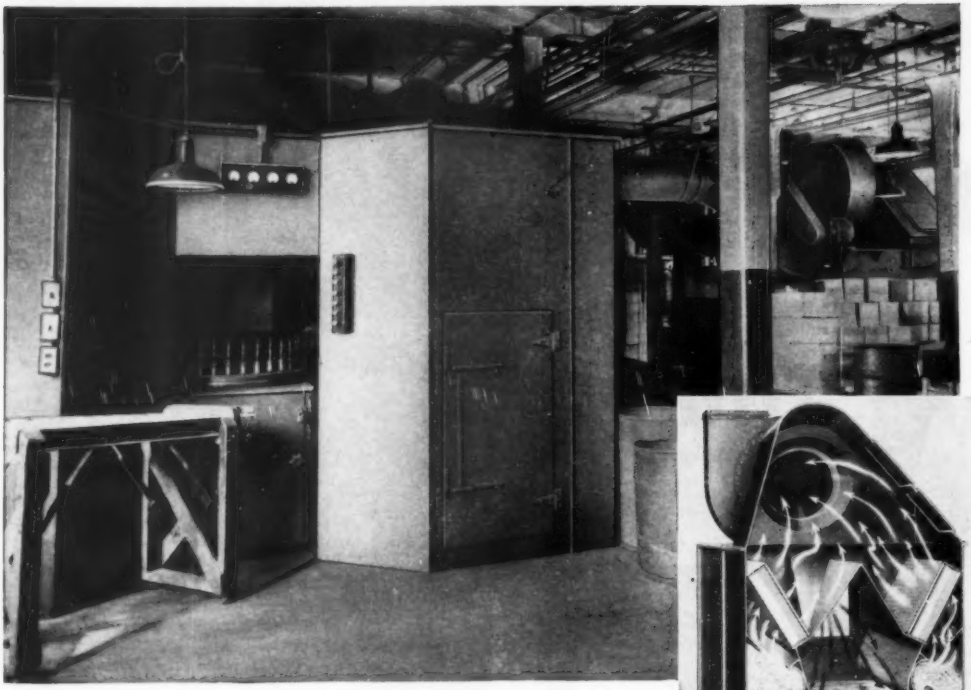

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This Arms Manufacturer Finds Type N ROTO-CLONE Collectors The Practical Answer For Clean Air . . . Better Housekeeping.

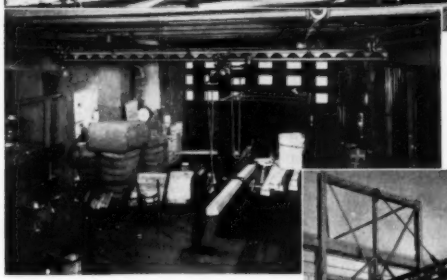
Buffing dust has individual characteristics that create a special problem. It is composed mainly of linty particles from buffing wheels which are often impregnated with sticky compounds. Automatic buffing produces this dust in quantities and its sticky nature makes it both difficult to control or to efficiently exhaust by ordinary methods. However, a large arms manufacturer is one of many concerns which has successfully solved this problem with AAF Type N ROTO-CLONES.

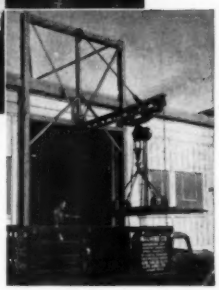
The Type N ROTO-CLONE is a Hydro-Static Precipitator providing collection efficiencies of more than 99%. This makes recirculation of cleaned air practical in most cases. In the Type N dust is separated from the air by means of a water curtain created by an induced flow of air through a specially designed impeller. Combined washing and scrubbing action produces high collection efficiencies on all types of dust. Arrangements are available for both manual and automatic removal of sludge.

Regardless of your clean air requirements or dust problems look to AAF for practical engineering solutions. AAF representatives are located in all major cities. Write for Bulletin 277.

American Air Filter
COMPANY, INC.
228 Central Avenue, Louisville 8, Kentucky

American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, California





IT'S EASY TO LOAD TRUCKS with CLEVELAND TRAMRAIL

Heavy or Unwieldy Materials Quickly Loaded with Minimum Handling

Hard pushing, pulling, lifting is practically eliminated when trucks are loaded or unloaded with Cleveland Tramrail. It is simply a matter of attaching the hook or proper grab, lifting with an easily operated electric or hand-chain hoist, and conveying directly to destination without in-between handling.

Time is saved! Trucks are loaded or unloaded in a fraction of the usual time. Safety is bettered! There are far fewer accidents when overhead handling equipment is provided. More materials can be handled! With the addition of the proper Cleveland Tramrail equipment, present loading dock areas will often keep apace with greatly increased plant production. Further, the less time a truck is standing idle, while loading or unloading, the more time it can be moving with pay loads.

(Above) Unloading 2-ton packs of steel sheets with a Cleveland Tramrail Model A Chain Hoist and hand-operated sheet lifter. The loading dock rail extension is a part of an extensive plant-wide Cleveland Tramrail system.

(Top picture) One man easily loads long, heavy boxes onto the truck with this hand-propelled crane and electric hoist.

(Right) Materials are taken directly from truck to fabricating department or vice versa with this Cleveland Tramrail system. For handling small numbers of sheets the inexpensive sling-type sheet grab is satisfactory.

★

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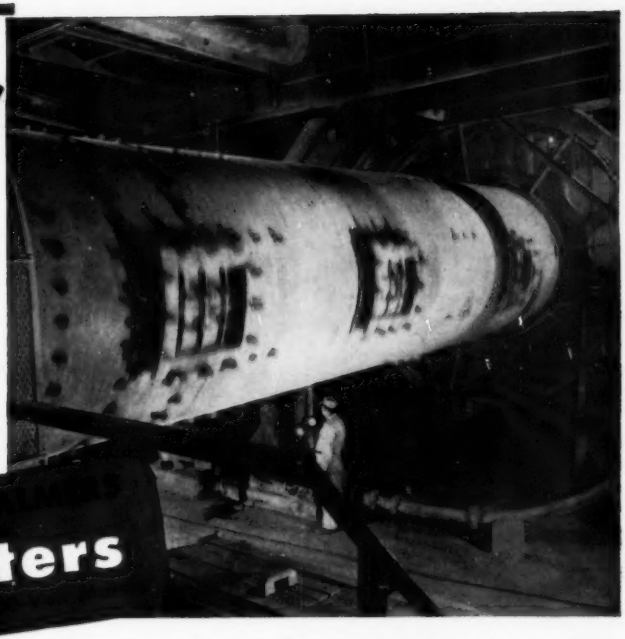
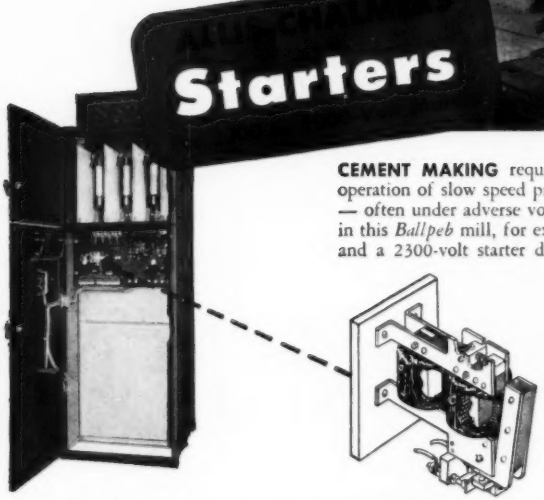
CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7526 East 284th Street, Wickliffe, Ohio

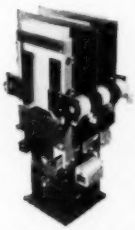
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

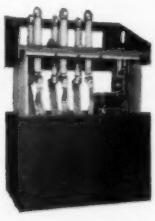
CONTROL *Engineered* for the cement industry





CEMENT MAKING requires controlled power for dependable, continuous operation of slow speed processing machinery operating in dusty atmospheres — often under adverse voltage conditions. Finish grinding of cement clinker in this *Ballpeb* mill, for example, needs a 550-horsepower synchronous motor and a 2300-volt starter designed to give complete protection to the motor.





ALLIS-CHALMERS Type H starters engineered for these applications provide complete control plus protection of motors, machines and personnel. Current limiting fuses, relays, instruments . . . everything needed is built in. Heart of every synchronous starter is the Type 230 field application relay.

DC EXCITATION is applied by this relay at the exact half cycle when proper rotor speed is reached. It maintains excitation during normal operation . . . removes excitation on motor pull-out . . . resynchronizes motor if pull-out condition is corrected before protective devices disconnect motor from line.

HIGH VOLTAGE starters may have either oil-immersed or air-break primary contactors as standard. Both types are designed for ready access . . . built to give long life with low maintenance. The selection of contactors for every Allis-Chalmers controller is based strictly on job requirements.

ALLIS-CHALMERS

Ballpeb is an Allis-Chalmers trademark.

There are Allis-Chalmers controllers for use in every industry . . . starters for squirrel-cage, wound-rotor and synchronous motors. For starters up to 2500 hp at 5000 volts—check with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wis., for Bulletin 14B6410A.

A-3717

SEPTEMBER 1952

Plant Engineering

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